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JOURNAL
OF
THE PROCEEDINGS
OF
THE LINNEAN SOCIETY.

ZOOLOGY.



VOL. IV.

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LIST OF PAPERS.

	Page
GARNER, ROBERT, Esq., F.L.S.	
On the Shell-bearing Mollusca, particularly with regard to Structure and Form	35
HANLEY, SYLVANUS, Esq., F.L.S.	
On the Linnean Manuscript of the 'Museum Ulricæ'	43
HUXLEY, Prof. T. H., F.R.S., F.L.S., F.G.S., Professor of Natural History, Government School of Mines.	
On the Dermal Armour of <i>Jacare</i> and <i>Caiman</i> , with Notes on the Specific and Generic Characters of recent <i>Crocodylia</i>	1
SALTER, S. J. A., Esq., M.B., F.L.S., F.G.S.	
On the Moulting of the Common Lobster (<i>Homarus vulgaris</i>) and Shore Crab (<i>Carcinus mænas</i>)	30
SANDWICH, Hon. H., M.D., C.B., Colonial Secretary of the Mauritius.	
On the Habits of the "Aye-Aye" (<i>Cheiromys madagascariensis</i> , L., Cuv.)	28
WALKER, FRANCIS, Esq., F.L.S.	
Catalogue of the Dipterous Insects collected at Makassar, in Celebes, by Mr. A. R. Wallace, with Descriptions of New Species	90
WALLACE, A. R., Esq.	
On the Zoological Geography of the Malay Archipelago	172
INDEX	185

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

November 4th, 1858.

Thomas Bell, Esq., President, in the Chair.

Robert Chambers, Esq., was elected a Fellow.

Among the presents were the following, for which the special thanks of the Society were directed to be given; viz.—

Linnaeus's MS. Diary and Translation; together with a series of Letters from Linnaeus to Menander, with Translations of many of them. These MSS. were formerly in the possession of the late Dr. Maton, V.P.L.S., and were presented by his niece, Miss Wray.

An extensive Collection of dried Plants, the present portion consisting of about 1000 species, formed in Java by T. Horsfield, Esq.; M.D., F.R. & L.S. Presented by the Court of Directors of the Hon. East India Company.

An extensive Collection of Australian and Tasmanian Plants, formed by Dr. Ferdinand Mueller, and including type specimens of many of the *Eucalypti* and *Acaciæ* described in his Papers, published in the Society's "Journal;" presented by Dr. Müller.

The valuable Collection of British Algæ, formed by the late Mrs. Griffith, and arranged according to Dr. Harvey's "Manual of British Algæ;" presented by the Subscribers to a fund for its purchase.

Read, the commencement of a Paper, entitled "Notes on British Botany;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings;" Supplement, vol. ii.)

November 18th, 1858.

Francis Boott, Esq., M.D., Vice-President, in the Chair.

Cyril C. Graham, Esq., and J. R. Kinahan, Esq., M.D., were elected Fellows; and Mr. Charles Barter an Associate.

The Vice-President in the Chair announced the formation by the Society of a British Herbarium; and Mr. Bentham (who, in conjunction with Dr. Alexander and Mr. Babington, and with the assistance of Mr. Oliver, had undertaken the arrangement of the Collection) stated that it was now completely arranged, and gave some explanation of the principles on which it had been formed.

Read, first, a continuation of Mr. Bentham's "Notes on British Botany."

Read, secondly, "Notes on some English Plants;" by John Hogg, Esq., F.R.S., F.L.S. &c.

December 2nd, 1858.

Thomas Bell, Esq., President, in the Chair.

Charles Ratcliff, Esq., and James Sidney Walker, Esq., were elected Fellows; and Dr. Frederick Welwitsch an Associate.

Read, first, a "Catalogue of the Hymenopterous Insects collected by Mr. A. R. Wallace at the Islands of Aru and Key;" by Frederick Smith, Esq. Communicated by William Wilson Saunders, Esq., V.P.L.S. (See "Zoological Proceedings," vol. iii. p. 132.)

Read, secondly, Notes "On the Linnean MS. of the Museum Ludovicæ Ultricæ Reginæ;" by Sylvanus Hanley, Esq., F.L.S. (See "Zoological Proceedings," vol. iv. p. 43.)

Read, thirdly, a "Note on the Morphology of the *Balsaminaceæ*;" by Prof. Henfrey, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iii. p. 159.)

Read, fourthly, a "Notice of the Arborescent Ferns of New Zealand;" by T. S. Ralph, Esq., A.L.S. (See "Botanical Proceedings," vol. iii. p. 163.)

December 16th, 1858.

Thomas Bell, Esq., President, in the Chair.

Thomas Henry Huxley, Esq., F.R.S., was elected a Fellow.

Among the presents was the extensive Herbarium of the late Thomas Bell Salter, Esq., M.D., F.L.S.; presented by his brother, S. James A. Salter, Esq., F.L.S., for which the special thanks of the Society were directed to be given.

Read, first, a "Notice of two Insect-products from China;" by Daniel Hanbury, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 178.)

Read, secondly, a "Monograph of the East Indian Species of *Utricularia*;" by Daniel Oliver, Esq., F.L.S. (See "Botanical Proceedings," vol. iii. p. 170.)

Read, thirdly, "Observations on the Structure of the Stem in certain Species of *Caryophyllæ* and *Plumbagineæ*;" by Daniel Oliver, Esq., F.L.S. (See "Transactions," vol. xxii. p. 289.)

January 20th, 1859.

Thomas Bell, Esq., President, in the Chair.

Thomas Anderson, Esq., M.D.; Thomas Boycott, Esq.; the Hon. Walter Elliot; the Rev. William Houghton; Dr. Ferdinand Müller; H. T. Stainton, Esq.; and Major Richard Strachey, were elected Fellows.

Read, first, a "Notice of *Entozoa* found in various Animals dissected at the Zoological Society's Gardens;" by Thomas Spencer

Cobbold, Esq., M.D., F.L.S. (See "Transactions," vol. xxii. p. 363.)

Read, secondly, a Paper "On *Tomopteris onisciformis*;" by W. B. Carpenter, Esq., M.D., F.R.S., F.L.S. (See "Transactions," vol. xxii. p. 353.)

Read, thirdly, "*Dennisonia, Barklya, and Laboucheria*; genera Floræ Australiæ nondum cognita;" by Dr. Ferdinand Müller, F.L.S. (See "Botanical Proceedings," vol. iii. p. 157.)

February 3rd, 1859.

Thomas Bell, Esq., President, in the Chair.

William Eatwell, Esq., M.D., was elected a Fellow.

Read, first, a Memoir "On *Henriquezia* of Spruce, a genus of *Bignoniaceæ*;" by George Bentham, Esq., V.P.L.S. (See "Transactions," vol. xxii. p. 295.)

Read, secondly, a continuation of Mr. Bentham's "Notes on British Botany."

February 17th, 1859.

Thomas Bell, Esq., President, in the Chair.

Howard Warburton Elphinstone, Esq.; Charles William Harrison, Esq.; and Dr. E. Percival Wright, were elected Fellows.

Read, first, a Paper "On the Dermal Armour of *Jacara* and *Caiman*, with Notes on the Specific and Generic Characters of recent *Crocodylia*;" by Thomas Henry Huxley, Esq., F.R.S., F.L.S. (See "Zoological Proceedings," vol. iv. p. 1.)

Read, secondly, a Paper "On the Anatomical Characters of Compound *Tunicata*;" by John Dennis Macdonald, Esq. Communicated by the Royal Society. (See "Transactions," vol. xxii. p. 373.)

Read, thirdly, "On the Anatomical Characters of an Australian

species of *Perophora*;" by J. D. Macdonald, Esq. Communicated by the Royal Society. (See "Transactions," vol. xxii. p. 377.)

Read, fourthly, a "Catalogue of the Heterocerous *Lepidoptera* collected at Singapore by M. A. R. Wallace, with Descriptions of New Species;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 196.)

March 3rd, 1859.

Thomas Bell, Esq., President, in the Chair.

George Vernon Blunt, Esq., was elected a Fellow.

Among the presents was a Collection of Dried Specimens of British Algæ, formed by Dr. Cocks, of Plymouth; presented by the Subscribers for its purchase, to whom the special thanks of the Society were voted.

Read, first, a Letter from Mr. Charles Barter, A.L.S., to Sir William Jackson Hooker, F.L.S., on the Vegetation of the West Coast of Africa. (See "Botanical Proceedings," vol. iv. p. 17.)

Read, secondly, a Letter from M. Emile Bourgeau, addressed to Sir W. J. Hooker, on the Vegetation and Climate of the Saskatchewan. (See "Botanical Proceedings," vol. iv. p. 1.)

Read, thirdly, "Observations on the growth and times of appearance of some of the Marine Algæ;" by John Cocks, Esq., M.D. Communicated by Robert Hudson, Esq., F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. .)

Read, fourthly, a Note "On five new plants of Eastern Peru;" by Richard Spruce, Esq. Communicated by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iii. p. 191.)

March 17th, 1859.

Thomas Bell, Esq., President, in the Chair.

The Rev. George Weare Braikenridge; H. B. Brady, Esq.; and Samuel Gurney, Esq., were elected Fellows.

Read, first, a Memoir "On Vegetable Affinities;" by T. C. Hilgard, M.D. Communicated by Berthold Seemann, Ph.D., F.L.S.

Read, secondly, a "Note on Monstrosities of *Daucus Carota*, L., and *Trifolium pratense*, L.;" by Maxwell T. Masters, Esq. Communicated by the Secretary.

Read, thirdly, "Descriptions of new species of *Musci* from New Zealand and other parts of the Southern Hemisphere;" by William Mitten, Esq., A.L.S. (See "Botanical Proceedings," vol. iv. p. 64.)

April 7th, 1859.

Thomas Bell, Esq., President, in the Chair.

Edward Sheppard, Esq., was elected a Fellow.

The Secretary read the following letter addressed to him by Dr. Boott, Treasurer and V.P.L.S., accompanying the donation of a Miniature of the elder Hedwig, for which the special thanks of the Society were ordered:—

"MY DEAR BENNETT,—I send the ring containing the little miniature of Hedwig for the Linnean Society. You will see the name on the back in the hand-writing of Sir James E. Smith; and on referring to the second volume of his 'Memoirs,' p. 98, you will find a letter from the younger Hedwig, which accompanied the gift of the ring to Sir James, and at p. 107 Sir James's acknowledgment of both. The ring was given to me by Lady Smith in 1857, and I feel that it cannot but be acceptable to the Society, as a memorial of one of the most distinguished of its Foreign Members.

"Yours affectionately,

"F. BOOTT."

"J. J. Bennett, Esq., F.R.S., Sec. Linn. Soc."

The special thanks of the Society were likewise directed to be given to Mr. Bennett for his Donation of an extensive series of botanical works selected from the library of the late Robert Brown, Esq., D.C.L., V.P.L.S.

Read, first, a Paper "On the Cranial Characters of a Rat new to the British Fauna;" by S. James A. Salter, Esq., M.B., F.L.S.

Read, secondly, "On the Moulting of the Common Lobster (*Homarus vulgaris*) and Shore-Crab (*Carcinus mænas*);" by S. James A. Salter, Esq., M.B., F.L.S. (See "Zoological Proceedings," vol. iv. p. 30.)

Read, thirdly, a Note "On the Habits of the Aye-Aye (*Cheiromys madagascariensis*);" by Henry Sandwith, Esq., M.D., C.B., in a letter to Professor Owen, F.R.S., V.P.L.S. (See "Zoological Proceedings," vol. iv. p. 28.)

April 21st, 1859.

Thomas Bell, Esq., President, in the Chair.

John Forbes Watson, Esq., M.D., was elected a Fellow.

A Letter was read from Mr. A. G. Moore, F.L.S., mentioning the occurrence in considerable numbers of *Squilla Desmarestii* off Sea View and Bembridge, and of *Vespertilio murinus* about the cliffs at Freshwater, in the Isle of Wight.

A Letter was also read from Thomas Forster, Esq., M.B., F.L.S., giving some account of the phenomena of the present season on the French coast; and an Extract of a Letter from Albert Hambrough, Esq., F.L.S., announcing the discovery, on the sea-shore at Ventnor, of a rather scarce shell, *Vertigo cylindrica*.

Read, first, "Remarks on *Gnetum*;" by the late William Griffith, Esq., M.D., F.L.S. Communicated, with a Prefatory Note, by Professor Henfrey, F.R.S., F.L.S. (See "Transactions," vol. xxii. p. 299.)

Read, secondly, a "Note on the species of *Croton* described by Linnæus, under the names of *Clutia Eluteria* and *Clutia Cascarilla*;" by John Joseph Bennett, Esq., F.R.S., Sec. L.S. (See "Botanical Proceedings," vol. iv. p. 26.)

May 5th, 1859.

Thomas Bell, Esq., President, in the Chair.

Henry Munroe, Esq., M.D., and Charles Prentis, Esq., were elected Fellows; and Professor J. F. Brandt, Professor A. H. R. Grisebach, Professor J. L. Lovén, and Mons. H. A. Weddell, were elected Foreign Members.

Read, first, "Further Observations on the New Organ in the Antennæ of Insects;" by John Braxted Hicks, Esq., M.D., F.L.S. (See "Transactions," vol. xxii. p. 4.)

Read, secondly, a "Synopsis of the Genera *Thea* and *Camellia*;" by Berthold Seemann, Esq., Ph.D., F.L.S. (See "Transactions," vol. xxii. p. 337.)

Read, thirdly, a "Synopsis of the Fructification of the Simple *Sphæriæ* of the Hookerian Herbarium;" by Frederick Currey, Esq., F.R.S., F.L.S. (See "Transactions," vol. xxii. p. 313.)

Read, fourthly, a second Letter from M. Emile Bourgeau, addressed to Sir W. J. Hooker, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. 13.)

May 24th, 1859.

Anniversary Meeting.

Thomas Bell, Esq., President, in the Chair.

This day, the Anniversary of the birth of Linnæus, and the day appointed by the Charter for the Election of Council and Officers, the President opened the business of the Meeting with the following Address:—

GENTLEMEN,

THE year which has passed since I last had the pleasure of meeting you on our Anniversary, has not been unproductive in contributions of interest and value, in those sciences to which we are professedly more particularly addicted, as well as in every other walk of scientific research. It has not, indeed, been marked by any of those striking discoveries which at once revolutionize, so to speak, the department of science on which they bear; it is only at

remote intervals that we can reasonably expect any sudden and brilliant innovation which shall produce a marked and permanent impress on the character of any branch of knowledge, or confer a lasting and important service on mankind. A Bacon or a Newton, an Oersted or a Wheatstone, a Davy or a Daguerre, is an occasional phenomenon, whose existence and career seem to be especially appointed by Providence, for the purpose of effecting some great important change in the condition or pursuits of man.

The establishment of the inductive method (by which the whole face of philosophy, before chaotic, was reduced to order), the discovery of the law of gravitation, the invention of the electric telegraph, or the production of sun-pictures—these and similar results of genius, by which the advance of knowledge and the designs of Providence are carried forward by grand and unexpected impulses, are occurrences, the like of which we must not expect to have annually to record.

Nor are even the striking examples to which I have referred, influential as they are and original as may be the genius which finally applies them, usually isolated or sudden. The suggestions of previous experiment or discovery, the hints which are given from time to time by either fortuitous or anticipated phenomena, ordinarily afford the ground upon which the most important discoveries or improvements are made. The electric telegraph may be traced from the first intimation of the possibility of the transmission of the electric force to a distance, through successive occasional advances, to the happy hour when Oersted discovered the great truths of electro-magnetism, and Wheatstone applied the discovery to a purpose which is destined to affect, more than any other single practical application of science that was ever made, the condition, the destinies, and the welfare of mankind. In like manner the consecutive suggestions of Watt, of Davy, of Talbot, of Herschel, of Daguerre, of Niépce de St. Victor and others were required to bring to even its present state of advancement, the art of photography. The history of almost every scientific discovery of importance would afford similar illustrations, which will suggest themselves to your minds, and which it is unnecessary for me to enlarge upon.

Of the results of such successive developments as those to which I have referred, in those departments of science which are usually considered as of a more abstract character, and in those which are properly the subject of experimental processes, the late President of the Royal Society gave at their last Anniversary some very instructive examples in his lucid and interesting address, which

has doubtless been in the hands of most of the Fellows of this Society; and I hope that I shall not be considered as travelling much out of the record, if I recall at this time, when the Royal Society has so lately been deprived of his services, the great merits of one who would yield to no one of his predecessors in a zealous and unselfish devotion to the interests of science, in the employment of the prestige which his social and official position alike gave him in promoting its objects, and in the solid judgment, never within my experience surpassed, by which the affairs of the Royal Society were conducted by him, whether in Council or in private;—and in addition to these considerations, the Fellows of the Linnean Society would, with good reason, consider me as wanting in my duty to them, as well as to that excellent nobleman, if I were to omit a grateful allusion to the kind and friendly interest which he invariably manifested for the welfare of this Society, and the urbanity and consideration with which he ever received any suggestions for that mutual assistance and goodwill which he was always anxiously desirous to promote.

I cannot, however, close this digression without referring with grateful satisfaction to the choice which the Royal Society has made of a successor to Lord Wrottesley, in the person of one who devoted the leisure hours of a long and laborious professional career to the successful cultivation of a branch of science allied to those which are considered as especially the objects of this Society; whilst by a marvellous power of acquiring and retaining knowledge, and by that incessant employment of the intervals of professional labour in which, as our great moralist has well declared, consists the true economy of time, he has stored his acute and capacious mind with a fund of knowledge as rich as it is varied. In the close relation in which we now happily stand to the Royal Society, the appointment of its President is matter of no small moment to us in our corporate capacity, in addition to the interest we must feel as competitors in the arena of scientific labour; and I am quite sure that we shall continue to enjoy in the conduct of the present President the advantages of that combined kindness and wisdom which characterized his predecessor.

If the events of the past year have not, however, as I have stated, been so influential or emphatic as some which have marked the period of their occurrence as an epoch in scientific history, the more silent and finally not less productive current of discovery is ever going on, and its recent results in every field of research have been such as to prove that the yearning after knowledge was never

more earnest, nor the love of the truths of nature ever more ardent and sincere than at the present time. In evidence of this steady progress I will refer you to the meetings of our own Society, and the results of those meetings in the papers already published, or about to be published, in our 'Transactions' or the 'Journal of Proceedings.' I believe that I may safely compare them with those of any former period for their variety and value. The botanical element of our functions still predominates as it has done; and, from the nature and comparative extent of the two pursuits, it must continue to predominate. Such indeed has been the number of papers in this department, considered by the Council as worthy of publication, that it has been found necessary to issue, within the year, two supplemental parts of the 'Journal of Proceedings;' a step, which, although requiring much consideration on account of the expense, is fully justified by the importance of the contents of the volume.

But while we have thus advanced in the quantity of valuable matter presented to us in our botanical department, a glance at the communications belonging to the other branch of our labours will show that in zoological science we have not been retrograding either in their number or value. There is, however, yet room for a more zealous movement amongst the zoologists of our body; and the complaint which I ventured to express on a former occasion is not yet rendered unnecessary or untimely. Many papers on zoological subjects are still read at the meetings of collateral societies, which, as it appears to me, would legitimately belong to us, and would merit a situation in our own publications, where some of them at least would be more in place than where they now appear.

In recurring thus to the 'Transactions' of the past year, I abstain from particularizing any of the papers as especially interesting or valuable, as selection would be invidious where all are good, and every student will be able to judge for himself of their respective value and importance. Some of the most interesting of them—and this refers to papers which have been read at the meetings of other societies as well as of our own—are on subjects still under controversy, the discussion of which belongs to another arena than that of the brief address which it is my duty to offer to you; for I have always thought that this is not the fit occasion for the enunciation of individual opinion or judgment, but rather for a simple sketch of the general working of the Society and the progress of science in connexion with it.

The primary and ostensible office of the Linnean Society is, un-

doubtedly, the promotion and record of discoveries or improvements in the science of Natural History, both in its systematic and physiological phase, by means which the Charter has provided,—in its meetings, its publications, its library, and its collections; but, as the recognized centre and head of these sciences in this country, it has always appeared to me that the Society might exercise certain collateral functions (having for their object the encouragement of this branch of knowledge, and its spread amongst the people) which are not wholly alien from that primary object, and which may legitimately come within the scope of its original design. To one of these I called attention on a former occasion, when I suggested that a relation might with advantage be established between the Society and the numerous respectable local institutions now existing in almost every county in England, having for their object the cultivation of the natural history and antiquities of the neighbourhood. But besides this, may there not be another, equally if not more efficacious means of promoting this object, in the aid and patronage which the Society might, indirectly perhaps, but not ineffectually, afford to that educational movement which appears to have decidedly taken place in this direction? Whether or not it be practicable for us as a body to take any ostensible part in this important work is at least doubtful, but certainly it behoves every Fellow of the Society in his individual and personal capacity,—I might almost say in fulfilment of his initiatory obligation, entered into when he joined the Society,—not to omit any opportunity of furthering this desirable end. It is very cheering to the mind of every one who fully apprehends the unspeakable value of these studies in forming the mind and ameliorating the tempers and affections of our youthful population, by exciting and fostering a love of Truth, and training them in the knowledge and admiration of the works of God, to see that there is a daily increasing appreciation of their importance. Nothing can more evidently manifest this encouraging feature of the educational tendencies of the present day, than the great demand for popular works on natural history, whether of a more systematic or biographical character,—whether general or limited to one special department. This demand is liberally supplied by the issue of numerous works, which, if they are not all characterized by perfect accuracy of detail, or philosophical views of generalization, or sound principles of arrangement, are yet calculated to excite and, in great measure, to satisfy the growing appetite for this department of knowledge. Such works as I refer to may be enumerated

by scores,—the least valuable of which would have been hailed in my early days of boyish love for natural history, as the greatest boon that could have been offered. Nor let it be supposed that the results of such reading, elementary though it be, is of slight import. The consequence may be very important, and some future Cuvier or Owen may refer his earliest scientific tendencies to the perusal of some of these educational works: “*res parva, sed initium non parvæ.*”

There are few circumstances which have a more powerful tendency to promote the love of such pursuits than the ready access of the masses of the people to the most beautiful and interesting natural objects, and their exhibition in a form at once pleasing and instructive. In this respect, as well as in its more important phase as illustrative of the progress of botanical science and its application to practical purposes, there is no existing fact which claims greater attention or excites deeper interest than the noble gardens at Kew. The statistics of this great Government establishment are so important, and involve so many considerations which are of public moment, as well as such advantages to the scientific student, that a brief account of the progress recently made in its different departments, cannot fail to be interesting to the Fellows of the Linnean Society.

At a time when the public mind is fully awake to the great importance of affording to the people the means of rational and healthful enjoyment, and when the efforts of all who are earnest on the great subject of popular education are directed to the best means of instruction in those sciences which are at once economically useful and intellectually improving, the ready and free access to such sources of mental enjoyment and practical information as are here combined on a scale of unexampled magnificence, must be a subject of the deepest interest, and the success of the establishment a cause of hearty congratulation.

The vast number, the extreme beauty and the healthy and flourishing condition, no less than the intrinsic value of the living vegetation within the precincts of the garden, especially in those parts of it to which the steps of the public are ordinarily directed—the admirable arrangement of the grounds and the charming walks—combined with the facility with which access is attained to such attractions, render it no matter of surprise that even at such a distance from the metropolis, the gardens are frequented by visitors whose annual numbers are no longer to be counted by

hundreds or by thousands, but by hundreds of thousands. The number of persons who visited the gardens during the last year amounted to no less than 405,376; which, contrasted with the comparatively small number of 9174 in the year 1841—since which time, with one or two exceptions, every succeeding year has surpassed that which preceded it—shows an increase both in the attractions of the place, and in the public appreciation of its beauties and advantages, which are highly gratifying and suggestive. A perusal of the annual reports from Sir William Hooker to the Government, will show the most satisfactory and regular progress in every department and phase of the establishment.

The Arboretum, now the finest in Europe, contains all the most important species of hardy trees, in the most healthy and flourishing condition, which may be examined and studied by every one who is interested in Arboriculture or in the Botany of Trees. The Queen's garden has received a liberal addition of 14 acres to its extent; a large lake of $4\frac{1}{2}$ acres is in progress of construction; and the whole of this portion of the gardens is advancing rapidly to as nearly a perfect state as an energetic application of art and science can render it.

Every one is too well acquainted with the magnificent Palm-house, and the other receptacles for plants requiring heat and protection, to render any particular description necessary; it is sufficient to say that here also continual improvements are going on. But gratifying as are the advances which are taking place in this more obvious and popular province, the scientific botanist is perhaps more interested in the unrivalled herbarium, which, with its accumulated treasures, has for some years past constituted a focus of attraction, not to the botanist of this country only, but to the students of the science from all parts of Europe and from America. The list of those who have considered it worth their while to take up their temporary abode at Kew for this especial purpose, includes many of the most distinguished names amongst the botanists of various parts of Germany, of Denmark, of Sweden, of Russia, of France, and of different states of the American Union, as well as the most eminent cultivators of the science in the United Kingdom; and the standard works which have been either wholly or in part completed from this source are too numerous to be now particularized. The rescue of the available portion of the accumulated mass of herbaria which had lain for years in the cellars of the India House, and were fast going to destruction, which has been effected in consequence of remonstrances from Kew, and their de-

posit amongst the treasures of that great emporium, is another feature in the recent arrangements made under the superintendence, and emanating from the zeal of Sir William Hooker, which cannot fail to be of the greatest advantage to the Indian botanist.

But if there be one department in the Kew establishment which is more generally interesting than another, it is, in my opinion, the Museum of Economic Botany. This beautiful repository of the various applications of vegetable matters to the uses of mankind, is, I believe, unrivalled in any other country. Its interest is not confined to the man of science—it belongs to the physician, the chemist, the manufacturer, the artisan in every grade and of every calling, to the artist and the scholar, the soldier and the man of law. The energy and intelligence with which this curious and beautiful collection has been built up and arranged reflects the highest honour upon Sir William and Dr. Hooker, as well as upon those who, under their able direction, have worthily carried out their plans and arrangements; and under such management it cannot but continue to prosper.

It is not only at Kew, however, that the means of study have been augmented during the past year. The lamented death of Mr. Brown has occasioned the deposit in the National Emporium of his unrivalled collection of fossil woods, many of which are unique, and the whole of them of the highest interest and value. They were bequeathed to the British Museum, on the condition that they should be considered as part of the Botanical collection in that place. A large number of drawings of Australian plants and animals, from the pencil of Ferdinand Bauer, is another boon to that department, by the bequest of the same distinguished benefactor. These are drawn from the life; and it is unnecessary to say, to those who are acquainted with the productions of this matchless artist, that nothing of the kind exists more accurate and beautiful than are the whole of this fine collection.

Whilst speaking of the British Museum, and referring also to the late Keeper of the Botanical department, I am reminded of a fact, which I should not be acting in accordance either with your feelings or my own if I were to pass over without an expression of sincere gratification,—I allude to the appointment of one to whom we, as a Society, owe a debt which we can never hope in any degree to liquidate, our excellent Secretary, as the successor of Robert Brown. That appointment is as deserved on his part as it is an act of justice on the part of the Trustees; and I am sure that you will all unite with me in affectionate and earnest

wishes that Mr. Bennett may long continue to exercise the functions of an office which every one felt to be so justly his due.

I will now return to the more direct affairs of the Linnean Society itself. Here, as is usual, we have to approach the subject with mingled feelings of congratulation and regret. Whilst we have cause for great satisfaction in the progress which has been made in science under the auspices of the Society, the increase in the number of our members, the favourable condition of our finances, enabling us to provide for not only the continuance, but the increase of our publications, whilst we see fresh volunteers in the peaceful array of Science enlisting under our banners, there is another and a gloomy phase to which our attention is painfully enforced. The loss which we sustain from time to time by death, as it is always a subject of deep regret, and one on which it is painful to dwell, presents on the present occasion a more than usually sad aspect. Our obituary includes two of the most distinguished men who have ever adorned our Society—Robert Brown on our home list, and Alexander von Humboldt on that of our foreign members, are names which it is an honour to this Society and to any other to which they belonged, to have had enrolled amongst its members. The first scientific societies and academies in Europe numbered them amongst their most honoured associates; and their mutual esteem and their high estimation of each other's talents and labours reflected equal honour upon both. To the scientific world the loss is indeed great; and in our own sphere, although, with the rest of the world, we lament the extinction of such a splendid light as Humboldt, yet as a few only of our number enjoyed the happiness of his intimate friendship, our feelings of personal and affectionate sorrow are more awakened by the removal of him with whom we were in the constant habit of familiar and delightful intercourse.

But to both these great men is due the tribute of our sincere and profound regret. On the one hand, the Prince of Botanists, the man of universal information, of a rare and solid wisdom, the firm and constant friend, the kind and genial companion, the honest and upright man;—on the other, the profound philosopher, the universal genius, comprehending within the vast grasp of his mind such an extent and variety of knowledge, such an instinctive perception of the truths of nature, as have rarely, if ever, fallen to the lot of any man before him,—such are the two men whom, as during this life they were the objects of our veneration and love, we now, with a corresponding earnestness, deplore.

Any attempt on my part to do justice to this subject would be wholly futile, in anticipation of the memorial which you will presently hear from our esteemed Secretary, whose facile pen displays even more than its wonted eloquence when employed on the character of those whom he has loved and respected; but there are one or two circumstances, to a knowledge of which I have had incidental access, either connected with the career of Mr. Brown, or in which I have been personally concerned, which I will beg your permission to mention.

When a great man has departed from amongst us, and we are enabled to take, as it were, a bird's-eye view of his whole career, and contemplate all that he has achieved in the sphere of action, whatever that may be, in which he had distinguished himself,—when, especially, there has been some one line of discovery in which he has stood out from the ranks of his fellows, and with which his name has become identified,—it is interesting to look back into the distance and discern the one event, in itself probably trivial, which formed the starting-point of his journey, and had given a colour and a character to the subsequent history of his life and fame.

A simple letter which now lies before me constituted such a turning-point in the life and prospects of him whom we all deplore, and who gave a tone and impress to the science which he pursued with such untiring zeal, with such bright and clear intelligence, and with such enduring results. In a letter from Correa da Serra, who was at that time a frequent visitor to the library of Sir Joseph Banks, addressed to that distinguished patron of science, the future *Princeps Botanicorum* is recommended to conduct the Botanical investigations belonging to the proposed voyage of discovery to New South Wales, then about to be undertaken under the command of Flinders, and which was destined to lay the foundation of a future fame coextensive with the regions in which his transcendent labours could be appreciated. This remarkable letter forms an item in the important mass of materials now consigned to my temporary keeping, which I trust may hereafter form the basis of a life of the distinguished President of the Royal Society, to whom I have just referred. It will be readily imagined that, in the load of correspondence of which the greater part of these documents consists, some records might be found which would illustrate the intimate relation in which these two celebrated men stood to each other, and the influence which the talents and judgment and knowledge of Robert Brown must have exercised upon his respected patron and friend. An indirect indication of

this influence is afforded by some letters from Sir Joseph Banks, with reference to the unhappy voyage of Tuckey to the Congo, which, as it refers to an incident in my own life, and to my first introduction to my late revered friend, I trust that I shall be excused for relating. Many of you are aware that there was offered to me in the year 1815 the appointment of Naturalist to that ill-fated expedition. I sought an interview with Sir Joseph Banks, to whom I was referred for information, and with whom rested that appointment. Sir Joseph Banks being absent, I had a long conversation with Mr. Brown, then his librarian; and he, with his accustomed kindness, laid before me the difficulties, the dangers, and the improbabilities of success, which presented at that time such formidable discouragements to those who were to form the expedition, and which were in great measure the cause of my declining the appointment. Now, on looking over the voluminous correspondence which I have mentioned, it struck me as highly probable that I should find some allusion to the circumstances of the expedition; and I find, in several letters from Sir Joseph Banks to the Government, representations which coincide entirely, as far as my memory serves me, with many of the dissuasive reasons which Mr. Brown had urged upon me.

I will not trouble you longer upon these painful subjects, which will presently be presented to you more at large. Happily there are other and more cheerful matters to which it is my duty to recur; there is the white as well as the black side of the shield.

Of the presents which have been made to our library and collections, besides an unusual number of valuable books of the ordinary description, there are some which demand especial notice. A large collection of desiderata has been presented by Mr. Bennett, of books which had belonged to the late Mr. Brown, to the extent of about 300 items, many of them of particular value to us; and we have just received from our respected Fellow, Mr. Cuming, the gift of all the works, not already in our possession, from his large collection of conchological publications, perhaps altogether the most complete in the world—those presented to us amounting to about 200 volumes. These munificent donations will fill up many hiatus in our library, and render it very complete in those departments to which the works particularly belong.

A very interesting addition has been recently made to our collection of Linnean MSS. by the presentation of many original letters of Linnæus formerly belonging to my old friend Dr. Maton,

for many years a respected Vice-President of the Society; to whose niece, Miss Wray of Ryde, we are indebted for this most acceptable present.

In the Botanical collections we have received from Mr. James Salter the whole of the Herbarium of British Plants of our lamented Fellow, Dr. Bell Salter of Ryde; which, in addition to its being perhaps one of the most complete British Herbaria ever formed, possesses a peculiar value from its containing the typical specimens of his species in the genera *Rosa*, *Rubus*, *Saxifraga* and others, to which, as is well known, he had paid especial attention. A complete set of specimens from the great Javan Herbarium of our venerable and distinguished Fellow, Dr. Horsfield, has also recently been presented to us, by which our already extensive and highly valuable Indian collections will be greatly increased in interest and importance. These have already passed through the hands of our Foreign Member, Professor Miquel of Amsterdam, now engaged on a Flora of Java, by whom they have been named.

Before I conclude, it may perhaps be expected that I should allude to a subject which has excited a good deal of anxiety, and, at one time, some alarm in the minds of the Fellows of the Societies which meet in this mansion—I mean the proposed erection of buildings for various objects connected with Science and Art on the area of the ground belonging to this place. It was of course to be expected, and greatly to be desired, that so advantageous a site should not be left unoccupied whilst there were so many Societies and Institutions connected with intellectual pursuits which were wholly unprovided with an independent local habitation, or were but inconveniently and uncertainly placed. Some have to obtain accommodation for themselves and at their own expense; and even those which enjoy the privilege of meeting in apartments provided by the Government, are wholly severed from those kindred institutions, a near approximation of which would be so mutually beneficial. It will be recollected that the movement which some years since originated in the anxiety of a number of Fellows of the Royal and other Societies to obtain a juxtaposition of the Chartered Societies which represented departments of Science, terminated in our obtaining from the Government the present advantageous position for the three bodies now occupying Burlington House. Still the plan was but imperfect, and we have always anticipated the probable appropriation of the whole site to the great object of bringing into one

focus all the principal institutions connected with Literature, Science, and Art, with a grandeur and completeness worthy of the nation.

Still it was matter of serious concern in what manner it should be carried out. Whether the whole space should be appropriated to this "holy alliance," or whether they should be locally associated with offices of mere Government business,—whether the nature and position of the buildings should be so arranged as to allow the present noble erection to remain, and thus its present occupants to retain their place within it undisturbed, or whether it would be necessary, in carrying out the final plans of the architect, to level with the ground a building so handsome, so substantial, and so well adapted to its present purpose. Supposing the latter alternative to be decided upon, there sprung up the important question whether the new buildings were to be completed and ready for our permanent occupation before we should have to quit the tenure of our present abode. Although it is not in my power to enter into any detail on the plan and arrangements of the architects appointed by the Government, I have great satisfaction in being able to state confidently that there is every disposition on their part to meet our wishes in the most effective and liberal manner. There will be no disturbance of the Societies in these present apartments until the new ones are fit for their reception. Our own accommodation will, there is every reason to anticipate, be even more complete than at present; and I trust that our proximity to the Royal Society, from which both have derived so much comfort, and I trust mutual accommodation and advantage, will still be provided for.

Gentlemen, I will not detain you longer. With an increasing revenue, with enlarged means of carrying out our mission, with a list of Fellows more numerous, and I trust and believe more energetic in the cause of Science than ever, I feel that I have a right to conclude this address with the feeling of deep gratitude for the past, of sincere congratulation on our present condition, and of the brightest hope for our future prospects.

OBITUARY NOTICES.

The Secretary then read the following notices of deceased *Fellows, Foreign Members, and Associates*:—

William John Broderip, Esq., was born in Bristol, November 21st, 1789. His father was an eminent medical practitioner in

that sea-port, and his collections of shells and corals afforded the child some of his earliest and favourite playthings. A schoolboy at the Rev. S. Sayer's academy, one of the amusements of the vacations was the arrangement and the study of the species of the paternal museum; so that when young Broderip proceeded to Oxford, to be matriculated at Oriel College, he took with him, in addition to that basis of sound classical knowledge, in forming which Sayer had so high a reputation, a larger amount of zoological knowledge than perhaps any member of the learned University at that time possessed.

Dr. Buckland, who then (1809) was Fellow and Tutor of Corpus Christi College, wrote of Broderip, in a letter now in his son's possession, "In my earlier years of residence at Oxford I took my first lesson in field geology in a walk to Shotover Hill with Mr. William John Broderip, of Oriel, whose early knowledge of conchology enabled him to speak scientifically on the fossil shells in the Oxford oolite formation, and of the fossil shells and sponges of the greensand of the Vale of Pusey near Devizes, as to which he had been instructed by the Rector of Pusey, Mr. Townsend, the friend and fellow-labourer of Mr. Wm. Smith, the father of English geology. The fruits of my first walk with Mr. Broderip formed the nucleus of my collection for my own cabinet."

The value of an early cultivation of Natural History has rarely been exemplified in a more striking degree than in the consequences of this collision of congenial minds, and in the splendid results which may be attributed to the stimulus which the special knowledge of the undergraduate gave to the Fellow of Corpus, who subsequently became the famous Professor of Geology in the University of Oxford.

The son and biographer of Dr. Buckland has remarked that "in after years Mr. Broderip was associated with Dr. Buckland on the closest terms of family friendship and intimacy; and he rendered him the greatest assistance in his scientific labours, more especially in the revisal of the earlier editions of his 'Bridgewater Treatise.'"

Mr. Broderip, besides his proficiency in the classical and dialectic studies of Oxford, of which the influence is manifested in his subsequent writings, attended the anatomical lectures of Sir Christopher Pegge, and the chemical and mineralogical lectures of Dr. Kidd.

After taking the degree of B.A. he proceeded to London, entered at the Inner Temple, and commenced the study of the law in the

chambers of Godfrey Sykes, having as fellow-students, Patterson and Coleridge, who were subsequently raised to the Bench. In 1817 Mr. Broderip was called to the Bar, and selected the Western Circuit. He soon became favourably known as a diligent prosecutor of the dry and difficult studies of his profession. He published an edition of 'Callis on Sewers,' which has become a law classic; and, in conjunction with Mr. Bingham, the present metropolitan magistrate, he brought out three volumes of "Law Reports." Lord Sidmouth, in 1822, appointed Mr. Broderip magistrate at the Thames Police Office.

The arduous duties of police magistrate were performed by Mr. Broderip at that office, and subsequently at the Westminster Court, during thirty-four years, with a combination of sound legal knowledge, firmness, good sense, kindly consideration, and compassionate mercy in every admissible case, which established his reputation as one of the best magistrates of which this vast metropolis has had the advantage, and which gained for him the confidence and esteem of each successive Minister for the Home Department.

The first seat of his judicial labours was in the midst of that mighty fleet which brings to the port of London the treasures and rarities of the world. Mr. Broderip's early fondness for Natural History was here revived, and he availed himself of his environment to begin the formation of those collections of natural objects which had been the source of the cherished pleasures of his childhood.

The conchological cabinet of Mr. Broderip soon became classical; and there were few among the foreign Professors resorting to London who did not avail themselves of Broderip's urbanity and liberality, to visit and inspect the treasures which were accumulated in his chambers in Gray's Inn. This collection was ultimately purchased by the British Museum.

Mr. Broderip was elected Fellow of the Linnean Society in 1824, of the Geological Society in 1825, and of the Royal Society in 1828. He cooperated zealously with Sir Stamford Raffles, Sir Humphry Davy, Joseph Sabine, and Vigors in the formation of the Zoological Society, of which he was one of the original Fellows and Members of Council. He accepted the office of Secretary of the Geological Society, and performed the arduous duties of that office, conjointly with Murchison, to the year 1830. In a note to the writer, Sir Roderick testifies to Mr. Broderip's labours of that period: "My coadjutor preserved the *lucidus ordo* of our

meetings, made our 'Abstracts,' and was, in truth, the Naturalist of the Society."

To the 'Transactions of the Geological Society' (2nd series, vol. v. p. 171), Mr. Broderip contributed a Paper "On some Fossil Crustacea and Radiata found at Lyme Regis in Dorsetshire." His description of "The Jaw of a Fossil Mammiferous Animal found in the Stonesfield Slate," is published in the third volume of the 'Zoological Journal.' To the same periodical Mr. Broderip communicated "Observations upon the *Volvox globator*," "On the Manners of a live Toucan exhibited in this country," "On the Utility of preserving Facts relative to the Habits of Animals, with additions to two Memoirs in 'White's Natural History of Selborne,'" "On the mode in which the Boa Constrictor takes its Prey," "On the Habits and Structure of *Paguri* and other Crustacea," a "Notice on the *Mus messorius*," together with several valuable conchological articles. The chief bulk of Mr. Broderip's original writings on Malacology was consigned to the 'Proceedings' and 'Transactions' of the Zoological Society. I may refer to the Indexes of those collections and publications, and to the 'Bibliographia Zoologiæ et Geologiæ,' published by the Ray Society, for the titles of these numerous and valuable memoirs.

Few naturalists have more closely observed—none perhaps have more graphically and pleasingly described—the habits of animals. Mr. Broderip's "Account of the Manners of a tame Beaver," one of the pets that tenanted his chambers, published in the work entitled 'The Gardens and Menagerie of the Zoological Society' (vol. i. p. 167), affords a favourable example of his tact as an observer and power as a writer. Had circumstances permitted, he would have been a Field Naturalist second only to Gilbert White. When his friend Professor Owen became, through Royal favour, the tenant of one of the lodges in Richmond Park, Broderip would spend there much time in close observation of zoological phenomena afforded by the garden and the wooded vicinity of Sheen Gate. A note announcing the commencement of nidification in the adjacent rookery, or the arrival of a migratory song-bird, would immediately bring the retired Police Magistrate to Richmond Park. Many references to facts so observed are made in those delightful combinations of profound and quaint learning with direct and close observation of nature which were contributed by Broderip to the 'New Monthly Magazine' and to 'Frazer's Magazine,' and which he afterwards collected and reprinted in the volumes entitled 'Zoological Recreations' (8vo,

1847), and 'Leaves from the Note-book of a Naturalist' (8vo, 1851).

Mr. Broderip was ever ready to aid a brother Naturalist. His collections, his rare zoological library, his pure classical taste and varied accomplishments, made the assistance he was able to give most valuable. We find it freely acknowledged in the early editions of Sir C. Lyell's 'Principles of Geology,' in the 'British Fishes' of Yarrell, in the 'Silurian System' of Murchison, and the 'Bridgewater Treatise' of Buckland. Broderip communicated a most valuable "Table of the Situations and Depths at which recent Genera of Marine and Estuary Shells have been observed," to the Appendix of De la Beche's 'Researches in Theoretical Geology,' and, in conjunction with Captain King, "Descriptions of the Cirripedia, Conchifera, and Mollusca collected during the Voyage of H.M.S. Adventure and Beagle, 1826-30" (Zoological Journal).

To the 'Quarterly Review' Mr. Broderip contributed articles on the Zoological Gardens, on the Vine, on the Cetacea and Whale-fisheries, on the Writings of Captain Basil Hall, on the Bridgewater Treatise of Dr. Buckland, &c. But the main bulk of this indefatigable student's zoological writings are contained in the 'Penny Cyclopædia,' viz. from *AST* to the end, including the whole of the articles relating to "Mammals," "Birds," "Reptiles," "Crustacea," "Mollusca," "Conchifera," "Cirrigrada," "Pulmograda," &c., "Buffon," "Brisson," &c., and "Zoology."

At the latter period of his career Mr. Broderip was elected "Bencher" and "Treasurer" of Gray's Inn, and to him was confided the especial charge of the library of that ancient and honourable Society.

An attack of deafness, which resisted all the remedies applied, led Mr. Broderip to resign his office as Magistrate at the Westminster Police Court in 1856. His strict conscientiousness being equalled by a most delicate consideration for the feelings of others, he withdrew from much of that society of which the peculiar charms of his conversation and extensive and varied knowledge had made him an ornament and cherished member. His visits were now restricted to a very few of his oldest and most confidential friends, and he pursued his literary occupation with redoubled assiduity. His last publication, "On the Shark," appeared in the March Number of 'Frazer's Magazine.' It was the "first part" of an article on that subject, and bears all the marks of a mind in full intellectual vigour. On Saturday the 26th of

February, 1859, Mr. Broderip dined alone, at his chambers, returned to his favourite occupation in the evening, and retired to rest, leaving some sheets of his neat and fair MS. on his writing-table. He became unwell in the night, but did not consider himself so ill as to require medical aid; when it was obtained in the course of the following day, the symptoms of a fatal serous apoplexy had supervened, and he expired on the night of the 27th of February, aged 70.

Sir Arthur Brooke de Capell Brooke, Bart., M.A., was born in Bolton Street, May Fair, in the year 1791, and was educated at Magdalen College, Oxford, where he took his degree of Bachelor of Arts in 1810. In the same year he entered the army, and took the rank of Major in 1846. In 1823 he became a Fellow of the Linnean and of the Royal Societies, and subsequently also of the Geological. He died on the 6th of last December, at his seat, Oakley Hall, near Kettering, Northamptonshire, in the 68th year of his age.

In offering a brief sketch of the career of the greatest Botanist of the age, who for half a century formed the glory and ornament of our Society, our attention is chiefly arrested by his intense devotion to his favourite study, and by the calm, reflecting, and philosophical spirit which he brought to bear upon its pursuit, the combination of which qualities were alone sufficient to raise him, by his own unassisted efforts, to the highest position in the world of Science. *Robert Brown, Esq., D.C.L.*, was the second and only surviving son of the Rev. James Brown, A.M., Episcopalian Minister of Montrose, by Helen, daughter of the Rev. Robert Taylor, and was born in that town on the 21st of December, 1773. Several generations of his maternal ancestors were, like his father, ministers of the Scottish Episcopalian Church, and from them he appears to have inherited a strong attachment to logical and metaphysical studies, the effects of which are so strikingly manifested in the philosophical character of his botanical investigations. At an early age he was sent to the Grammar-school of his native town, where among his contemporaries was a boy of kindred talents, the late Mr. James Mill, with whom he maintained through life an uninterrupted intimacy. In 1787 he was entered at Marischal College, Aberdeen, where he immediately obtained a Ramsay bursary in Philosophy; and about two years afterwards, on his father quitting Montrose to reside in Edinburgh, he was removed to the University of that city, in which he continued his studies for several years, but without taking a degree, although

destined for the medical profession. At this early period the strong inclination of his mind to the study of Botany gained for him the favourable notice of the amiable Professor of Natural History, Dr. Walker; and he was induced, in the year 1791 (being then in the eighteenth year of his age), to lay before the Natural History Society, of which he was a member, his earliest Paper, containing an enumeration of such plants as had been discovered in North Britain subsequent to the publication of Light-foot's 'Flora Scotica,' with critical notes and observations. Although this Paper, like most of those read before the Society, was not intended for publication, it led to the communication of his specimens and observations to Dr. Withering, who was then engaged in the preparation of the second edition of his 'Arrangement of British Plants,' and laid the foundation of a warm and intimate friendship between them. In 1795, soon after the embodiment of the Fifeshire Regiment of Fencible Infantry, he obtained in it the double commission of Ensign and Assistant-Surgeon, and proceeded with it to the North of Ireland, in various parts of which he was stationed until the summer of 1798, when he was detached to England on recruiting service. Fortunately for himself and for science, this service enabled him to pass several months, during this and the succeeding year, in London, where he availed himself to the utmost of the library and collections of Sir Joseph Banks, from whom his already established botanical reputation obtained for him a cordial reception. In 1799 he returned to his regimental duties in Ireland, from which he was finally recalled, in December of the following year, by a letter from Sir Joseph Banks, proposing for his acceptance the post of Naturalist in the Expedition for surveying the coasts of New Holland, then fitting out under the command of Captain Flinders. Within two days of the receipt of this letter, which placed within his reach the so-much coveted opportunity of devoting himself entirely to his favourite pursuit, he quitted the regiment and the military service; and in the summer of 1801 he embarked at Portsmouth, full of ardour and confident of success. His absence from England lasted more than four years, during which the southern, eastern, and northern coasts of New Holland, and the southern part of Van Diemen's Land, were thoroughly explored. In the month of October 1805 he arrived in Liverpool with a collection of dried plants amounting to nearly 4000 species, a large proportion of which were not only new to science, but exhibited new and extraordinary combinations of character and habit.

Immediately on his arrival in England, he was appointed Librarian of the Linnean Society, of which he had been elected an Associate in 1798. During his voyage he had been indefatigable in describing with the minutest accuracy the whole of the materials which he had collected, and in the accumulation of a vast store of facts and observations in relation to their structure and affinities, as well as to all the most important points in the anatomy and physiology of plants in general. The new views which were thus opened to him on a multitude of botanical subjects, he was enabled, by his position at the Linnean Society, and by the free and unrestricted access which was liberally accorded to him to the treasures of the Banksian Library and Herbarium, to enlarge and to perfect, and to lay them before the world in a series of masterly publications, which at once stamped upon him the character of the greatest and most philosophical botanist that England had ever produced. In 1810 appeared the first volume of his '*Prodromus Floræ Novæ Hollandiæ et Insulæ Van Diemen*,' which was received by all the more profound botanists of this country and of the continent as the work of a mind thoroughly imbued with the principles of the Natural System, and giving to that system, which had hitherto found little favour out of France, a wider and a firmer basis. This important work, together with his *Memoirs on Proteaceæ* and *Asclepiadeæ*, which immediately followed, and his '*General Remarks, Geographical and Systematical, on the Botany of Terra Australis*,' appended to the '*Narrative of Captain Flinders's Voyage*,' published in 1814, by displaying in the most instructive form the superior advantages of the Natural System, whether in the monographic description of separate families, or in the comparison of the families with each other and with the entire mass of vegetation, gave new life to that system, and speedily led to its universal adoption. A series of *Memoirs* followed, chiefly in the *Transactions of the Linnean Society*, or in the appendices to various books of travel and survey, which gave fuller and more complete development to his views on almost every department of botanical science, and induced the illustrious Humboldt not only to confer upon him the title of "*Botanicorum facile Princeps*," but also to salute him with the more comprehensive and expressive designation conveyed in the dedication of the '*Synopsis Plantarum Orbis Novi*,' "*Roberto Brownio, Britanniarum Gloriæ atque Ornamento, totam Botanicæ Scientiam ingenio mirifico complectenti*." At the close of the year 1810, on the death of his old and intimate friend, the laborious, accurate and learned Dry-

ander, he succeeded to the office of Librarian to Sir Joseph Banks, who (on his death in 1820) bequeathed to him for life the use and enjoyment of his library and collections. These were subsequently, in 1827, with Mr. Brown's assent, and in conformity with the provisions of Sir Joseph's will, transferred to the British Museum; and from this latter date to his death, a period of upwards of thirty years, he continued to fill the office of Keeper of the Botanical Collections in the National Establishment. Soon after the death of Sir Joseph Banks he had resigned the Librarianship of the Linnean Society, of which he then became a Fellow; and having been for many years one of its Vice-Presidents, was at last prevailed upon, in 1849, to allow himself to be elected President. This office he retained till 1853. He became a Fellow of the Royal Society in 1811, and was several times elected into the Council. In 1839 he received its highest honour in the Copley Medal, presented to him "for his discoveries during a series of years on the subject of vegetable impregnation." In the meantime honours and titles had flowed in upon him from all quarters; and nearly every scientific Society both at home and abroad felt itself honoured by enrolling his name in the list of its Members. In 1832, the University of Oxford conferred upon him, in conjunction with Dalton, Faraday, and Brewster, the honorary degree of D.C.L. In the succeeding year he was elected one of the eight Foreign Associates of the Academy of Sciences of the Institute of France, his name being selected from a list including those of nine other *savans* of world-wide reputation, nearly every one of whom has since been elected to the same distinguished honour. During the administration of Sir Robert Peel, he received, in recognition of his great eminence in botanical science, a pension on the Civil List of £200 per annum. The King of Prussia subsequently decorated him with the cross of the highest Prussian Civil Order, "Pour le Mérite."

Among the more important of his Memoirs above referred to, may be mentioned his Papers on *Compositæ*, on *Rafflesia*, and on the Fecundation of *Orchideæ* and *Asclepiadeæ*, in the Linnean Transactions; the botanical appendices to the Voyages or Travels of Tuckey, Parry, Franklin, Abel, King, and Denham; his Papers on Active Molecules, and on the plurality of Embryos in *Coniferæ*, and his contributions to Wallich's 'Plantæ Asiaticæ,' and to Horsfield's 'Plantæ Javanicæ.' Of his later publications, the most remarkable are his "Botanical Appendix to Captain Sturt's Expedition into Central Australia," published in 1849; and his Me-

moir "On Triplosporite, an undescribed Fossil Fruit," published in the Linnean Transactions in 1851. The pervading and distinguishing character of all these writings is to be found in the combination of the minutest accuracy of detail with the most comprehensive generalization. No theory is propounded which does not rest for its foundation on the most circumspect investigation of all attainable facts. In perusing them, we are first struck with the evident completeness of the investigation, and next with the wonderful sagacity with which the ascertained facts are brought to bear upon the question at issue. And these distinguishing qualities are equally obvious throughout the wide range of objects treated of, whether in the anatomy, the physiology, the classification, the description, the distribution, or the affinities of plants, and in the examination both of recent and fossil structures. Among the most important anatomical and physiological subjects of which they treat, particular mention is due to the discovery of the nucleus of the vegetable cell, and of the circumscribed circulation on the walls of particular cells; the development of the stamina, together with the mode of fecundation, in *Asclepiadeæ* and *Orchideæ*; the development of the pollen and of the ovulum in Phænogamous plants, with the peculiarities of the latter in *Coniferaæ* and *Cycadeæ*, and the bearing of these facts upon the general subject of impregnation; the origin and development of the spores of Mosses; and the discovery of the peculiar motions which take place in the "active molecules" of matter when seen suspended in a fluid under the microscope. Of structural investigations, the most important are those which establish the relation of a flower to the axis from which it is derived, and of the parts of a flower to each other, as regards both position and number; the analogy between stamina and pistilla; the neuration of the corolla of *Compositæ*, their æstivation and inflorescence; and the structure of the stems of *Cycadeæ*, both recent and fossil. To the study of fossil botany Mr. Brown was always strongly attached, and with a view to its prosecution he formed an extensive and valuable collection of fossil woods, which he has bequeathed under certain conditions to the British Museum. His collections in other departments were also considerable, and his library very extensive.

In private life Mr. Brown's character was thoroughly estimable. Shrinking, with instinctive modesty, from all public employments, whether professional or otherwise, which appeared to involve anything like display, he was sometimes thought, by those who knew him little, to be cold, distant, and reserved; while those who were

admitted to the privilege of his intimacy bear unanimous testimony to his unvarying kindness of heart, the genial warmth of his feelings, and the pure benevolence of his disposition. To a mind stored with anecdote he united a strong sense of humour, and a happy facility in its expression, which rendered him a most delightful companion. And when to these qualities we add his perfect simple-mindedness, his unswerving devotion to truth, and that singular uprightness of judgment, which rendered him on all difficult occasions a most invaluable counsellor, we shall easily perceive how it was that he became so warmly endeared to the hearts of his friends. From the death of Sir Joseph Banks, who bequeathed to him his house in Soho Square, he continued to occupy that portion of it which opened upon Dean Street; and it was in the library of that illustrious man, the scene of his labours for sixty years, surrounded by his books and by his collections, that he breathed his last, on the 10th of June in the present year, and in the eighty-fifth year of his age.

John Cator, Esq., of Beckenham Place, in the county of Kent, is referred to by Mr. Lambert as connected with Natural History by his uncle's marriage with the daughter of Peter Collinson, and the consequent possession of those MS. Notes on Botanical subjects, by Collinson, which Mr. Lambert made the foundation of a Paper in the tenth volume of our 'Transactions,' and which the late Mr. Dillwyn subsequently printed separately under the title of 'Hortus Collinsonianus' 8vo: Swansea, 1843. Mr. Cator became a Fellow of the Linnean Society in 1811, and died at his house at Beckenham on the 20th of August, 1858, at the age of 76.

Richard Chambers, Esq., was born in London, in 1784. He was educated for the profession of a schoolmaster, and for many years had one of the largest private schools in the metropolis. Early in life he evinced a fondness for the study of natural history. He was elected a Fellow of the Linnean Society in 1822, and continued so to the close of his life, making occasional communications to the Society, besides being the author of 'An Introduction to the Study of Botany,' Lond. 16mo, 1847, and of many scattered Papers on kindred subjects in different periodicals. He was also one of the first members of the Zoological Society, having been one of the Zoological Club—the parent of that Society. As a teacher, he contributed largely to the cause of popular education. He was associated with Earl Stanhope and Lord Brougham in the first endeavours to establish schools for all, and the present system

of National Education owed much to the warm approval of his system by the Government Commissioners, after several official visits and lengthened communications. Mr. Chambers was the author of many works connected with education; he was an early member of the Society of Arts, an enthusiastic admirer of the fine arts, occasionally a public critic on the subject, and formed a choice collection of works by British artists. Besides his personal friends and relatives, some thousands of pupils, many now rising in the ranks of literature, science, and the arts, will recall with pleasure the instructions they received from his amply stored mind, his enthusiastic love of nature, his high moral precepts and example, his genial kindness, and his energetic endeavours to sow and foster the seeds of all worthy knowledge. The last ten years of his life were passed in retirement, and he died at Balderton, in Nottinghamshire, Dec. 20th, 1858, in the 74th year of his age.

John Samuel Gaskoin, Esq., was born at Bagshot in Surrey in September 1790, and received his education at a private school. At the age of sixteen he became a house-pupil of the Marylebone Infirmary, and subsequently attended the necessary lectures, together with the hospital practice of St. George's, St. Bartholomew's, and the Westminster Lying-in Hospital. In 1816 he went to Paris, where he remained about two years, still prosecuting his medical studies. On his return to London he established himself in practice, and in 1823 he was appointed Surgeon in Ordinary to King George the Fourth at Brighton, and in 1830 received a similar appointment to King William the Fourth. He was for many years Surgeon to Her Majesty's Theatre, Consulting Surgeon to the London Infirmary for Diseases of the Skin, and Honorary Surgeon to the Royal Freemason's Institution for Female Children. His attachment to Natural History, and especially to Conchology, led him to form a considerable collection of shells, which was particularly rich in the species of *Cypræa*, *Marginella*, and *Columbella*; and several Papers "On New Species of *Cypræa*" in the 'Proceedings of the Zoological Society,' bear witness to the extent both of his collections and of his scientific knowledge of them. He became a Fellow of the Linnean Society in 1853, and, as a frequent attendant at our meetings, was well known to a large number of our members as an amiable man of large information, and a very agreeable companion. In the Zoological Society and at the Art Union he also took an active part. He died suddenly of disease of the heart, at his house in Clarges Street, May Fair, while engaged in writing down the description of some shells

in his cabinet, on the evening of the 5th of October, 1858, in the 69th year of his age.

Thomas Charles Harrison, Esq., was the son of William Harrison, Esq., Q.C., a respected Fellow of our Society, of whom a short obituary notice is contained in the Anniversary Proceedings for 1842. The son, who became a Fellow of the Linnean Society in 1821, was placed by his father in the Treasury, of which he was Counsel, and became Principal Clerk in that department of the public service, after the murder of Mr. Drummond. He became F.R.S. in 1845, was a frequent attendant at our meetings, and, besides an inclination for Natural History, had a considerable taste for the fine arts, and had formed a valuable collection of paintings. He died on the 2nd of May, 1858, at the age of 65.

Robert George Holland, Esq., M.D., became a Licentiate of the Society of Apothecaries in 1817, and a Fellow of the College of Physicians in Edinburgh in 1838. In the same year he was elected a Fellow of the Linnean Society. He practised for many years as a Physician at Sheffield, and died on the 18th of November, 1857, at Hornsey Lane, near London.

The Rev. John Howson, M.A., was born at Giggleswick, near Settle in Yorkshire, in 1787, and was educated in the Grammar-school of that place, of which he himself was afterwards Second Master for the long period of forty-five years. This is the school at which the celebrated Archdeacon Paley was educated; and the Archdeacon's father was Head Master when Mr. Howson's studies began there. Giggleswick is close to the great Craven fault in the West Riding. Mr. Howson was an ardent lover of nature in all her aspects; and many were the rambles which he used to take with his pupils over a district peculiarly rich in botanical treasures. He became a Fellow of the Linnean Society in 1822, and died at Giggleswick on the 23rd of January in the present year, at the age of 72.

Sir Henry John Lambert, Bart., was born on the 5th of August, 1792, and in 1803 succeeded his father in the baronetcy. In 1820 he became a Fellow of the Linnean Society, and was also a Fellow of the Horticultural. He died at his seat, Aston Hall, Tetsworth, in the county of Oxford, on the 17th of December last, in the 67th year of his age.

Edward Moore, Esq., M.D., was the youngest son of Joseph Moore, Esq., of Plymouth, and was born in that town in the year 1794. He was principally educated at the Grammar-school at Plympton, and commenced his medical studies at Honiton. In

1815 he was admitted a Member of the Royal College of Surgeons in London; in 1827 M.D. of the University of Edinburgh; and in 1828 he became a Fellow of the Linnean Society. He was for many years surgeon of the North Devon Militia, and was one of the founders of the Plymouth Infirmary for Diseases of the Eye, of which he continued for thirty-three years to act, first as surgeon, and afterwards as physician, and to which he bequeathed a considerable legacy. The Plymouth Athenæum also owed much to his exertions: he was for many years actively employed as its Secretary, and was also a Vice-President, and for a time President. Here he lectured repeatedly on a great variety of scientific subjects. Up to the last he continued to devote his attention to its Museum as Curator of the Geological Collection, the arrangement of which was among his latest acts. He attached himself also more especially to the study of zoology in several of its departments, and contributed numerous papers to scientific periodicals on zoological and geological subjects. Those enumerated in the 'Bibliographia Geologiæ et Zoologiæ' of the Ray Society are as follows:—

1. On a new British Fish.—*Mag. Nat. Hist.* ser. 2. vol. i. p. 17.
2. On the Birds of Devonshire.—*Ibid.* pp. 113, 176, 227, 319, 361.
3. On the Change of Plumage in the Guillemot.—*Ibid.* p. 607.
4. On the occurrence of the *Teredo navalis* and *Limnoria terebrans* in Plymouth Harbour.—*Ibid.* vol. ii. p. 206.
5. Notice on the Pilot-fish (*Naucrates ductor*).—*Ann. & Mag. Nat. Hist.* vol. viii. p. 316.
6. Catalogue of the Malacostracous Crustacea of South Devon.—*Mag. Nat. Hist.* ser. 2. vol. ii. p. 284.
7. On the Discovery of Organic Remains in a raised Beach in the Limestone Cliff under the Hoe at Plymouth.—*Rep. Brit. Assoc.* 1841, Sect. p. 62, &c.

In the pursuit of these various branches of study, he was in frequent correspondence with Yarrell, De la Beche, Buckland and others, to whom he communicated many important facts. For the last four years of his life he was a Magistrate of his native town; and the estimation in which he was there held may be judged from the fact that his funeral was escorted by a numerous attendance of all the public bodies, the Members of the Medical Society, the Literary Institution, &c. He died at his residence in Athenæum Terrace, on the 17th of July, 1858, at the age of 64.

The Right Hon. Frederick John Robinson, first Earl of Ripon,
LINN. PROC.

was the younger son of Thomas second Lord Grantham, and was born in London, on the 30th of October, 1782. From Harrow, where he was contemporary with Peel, Aberdeen, Palmerston, and Byron, he proceeded to St. John's College, Cambridge, where he graduated as M.A. in 1802. In 1804 he became Private Secretary to his relative Lord Hardwicke, then Lord Lieutenant of Ireland; and from this time forward filled a variety of different offices in successive Administrations, until on the death of Canning in 1827, he became for a short time Prime Minister. On the formation of the Ministry of Earl Grey in 1830, he again returned to office, and continued, with brief intervals of retirement, to fill various cabinet offices, until the close of Sir Robert Peel's Administration in 1846, when he finally retired into private life. His Lordship married in 1814 Lady Sarah Hobart, only daughter of the late Earl of Buckinghamshire, by whom he leaves one only surviving child, George Frederick Samuel, the present Earl, also a respected Fellow of our Society, of the Council of which he has been an active member. The late Earl became Fellow of the Linnean Society in 1852, and died on the 28th of January in the present year, at his seat at Putney Heath, in the 77th year of his age.

Three years ago it was my duty to record the death of an old and valued Fellow of the Society, the late Mr. Thomas Salter, of Poole, in Dorsetshire, and to offer a slight tribute of respect to his memory. I have now to add to our list of deaths for the present year the name of his eldest son, *Thomas Bell Salter, Esq., M.D.*, of Ryde, in the Isle of Wight, an amiable and accomplished man, a distinguished medical practitioner, an able naturalist, and nearly connected with us as the sister's son of our excellent President. He was a Doctor of Medicine of the University of Edinburgh, Licentiate of the Royal College of Surgeons of that City, Member of the Royal College of Surgeons of England, and for twenty years practised at Ryde, where he was one of the original promoters of the Infirmary, to which he gave his gratuitous services up to the time of his death. In early life he commenced the formation of a Herbarium both of British and Foreign Plants, which became of considerable extent, and which his brother, Dr. James Salter, F.L.S., has since his death liberally presented to the Linnean Society. This herbarium, among other valuable plants, is particularly rich in the forms of the genus *Rubus*, on which Dr. Bell Salter particularly worked, and in regard to which he was regarded as the highest authority. His papers on Botanical sub-

jects are chiefly contained in the 'Phytologist,' and in the 'Botanical Gazette,' and the following is a list of them, as far as they are known to me:—

1. A Note on the Weymouth Stations of *Lathyrus Nissolia* and *Salicornia radicans*.—*Phytologist*, vol. i. p. 866.
2. On the effects of Cultivation on *Hyacinthus non-scriptus*.—*Phyt.* vol. i. p. 938.
3. Three days' botanizing at Selborne.—*Phyt.* vol. i. p. 1132.
4. Note on the *Filix-fœmina* as a Tree-fern.—*Phyt.* vol. i. p. 1141.
5. Observations on the genus *Rubus*.—*Phyt.* ii. pp. 87, 97, 131, 198.
6. On the yellow juice of *Ænanthe crocata*.—*Phyt.* ii. p. 116.
7. Remarks on the *Calamintha sylvatica* of Bromfield.—*Phyt.* ii. p. 171.
8. On the meaning of the word *recurvus*.—*Phyt.* ii. p. 200.
9. On the fertility of certain Hybrids. Read before the Isle of Wight Philosophical Society.—*Phyt.* ii. p. 737.
10. Effects of the mildness of the present Season (the Winter of 1852-53).—*Phyt.* iv. p. 847.
11. A Descriptive Table of British Brambles.—*Henfrey's Botanical Gazette*, vol. ii. pp. 113, 147.

Of all these the most important, next to his Papers on *Rubi*, are his observations on hybrids, the fertility of which he tested in the genera *Epilobium* and *Geum*, through numerous generations. On the death of his friend and neighbour Dr. Bromfield, he was requested, in conjunction with Sir W. J. Hooker, to undertake the publication of the elaborate materials collected by that lamented Botanist for a Flora of the Isle of Wight, which was published in 1856, by their joint care, under the title of 'Flora Vectensis.' In this work he naturally took great interest, having for ten or twelve years worked side by side with Dr. Bromfield, and he added much to its value by his own observations. Dr. Bell Salter became a Fellow of the Linnean Society in 1837, he was married only in the February of last year, and died on the 30th of September last, at the age of 44, at the house of his brother-in-law, Dr. Lake, of Southampton, after a very short illness. "A more kind or generous spirit," says the writer of a notice in a local paper, "never breathed; while his vast erudition threw a charm round his society for the like of which we shall have long to look in vain."

Benjamin Cruttall Pierce Seaman, Esq., of Rotherby and Hoby

in the county of Leicester, was elected a Fellow of the Linnean Society in 1821, and died at his house in Upper Gower Street, London, on the 13th of June, 1858, at the age of 63.

Major Edmund Sheppard, R.A., entered the service in 1806, became Lieutenant in 1808, and served at Walcheren in the following year. From 1814 to 1816 he served in Canada, and was present at several actions. In 1821 he became a Fellow of the Linnean Society; in 1825 he received his commission as Captain, and in 1838 that of Major; and in 1840 he retired upon half-pay. He died on the 6th of November last, at his residence, Rutland House, Kingston-upon-Thames, at the age of 68.

The Rev. Edward Tagart, F.S.A., F.G.S., was born at Bristol in 1804; he was educated at the school of Mr. Evans in that city, and subsequently at the Grammar-school, Bath, where he manifested great aptitude for learning. His parents giving him the choice of a vocation in life, he fixed upon the Ministry, and at the age of 17 was placed at Manchester College, York, the most eminent theological school in the Unitarian connexion, then conducted by Mr. Wellbeloved and Mr. Kenrick—names well known to all classical scholars. Having there completed his education, at the early age of 20 he went to Norwich, and was chosen pastor of the congregation then assembling in the Octagon, one of the oldest and most important in the Presbyterian denomination. Some of the most beautiful of the hymns used there were contributed by the late Sir James E. Smith, President of our Society. Sir James frequently attended Mr. Tagart's ministrations; and the acquaintance thus established ripened into friendship. In 1828 Mr. Tagart removed to London and took charge of a congregation in York Street, St. James's. Supported and strengthened by his efforts, they built for him the chapel in Little Portland Street, where he laboured to the end of his days; and in the religious body to which he belonged no name was more widely known or highly esteemed. He devoted himself zealously to his pastoral duties; and among his hearers were many eminent scientific men. Nor was his influence confined to his own denomination; for his position brought him, politically and socially, into contact with distinguished men of all churches. His pursuits naturally partook of a literary rather than a scientific character; but he contributed some papers to the 'Zoologist.' He was also the author of several works, chiefly biographical; but he particularly devoted himself to the study of Moral Philosophy, and was an ardent disciple of Locke, whose school he vindicated in a

work published in 1855, entitled "Locke's Writings and Philosophy." Mr. Tagart was for many years a Fellow of the Society of Antiquaries and of the Geological Society; but of late he most delighted in the meetings of the Linnean, of which he was elected a Fellow in 1852. Without contributing much to our publications or taking any prominent part in our discussions, he was constant in his attendance, and thus became well known to us all; and his loss will be deeply felt by many of us, to whom he was personally endeared by his genial character and his highly cultivated mind. His views were liberal and enlarged; and he manifested at all times an earnest zeal for the diffusion of science. Returning from Hungary (on a visit undertaken at the instance of the British and Foreign Unitarian Association) he was seized with an aguish fever, and died suddenly at Brussels, on the 12th of October last, in the 55th year of his age.

Richard Taylor, Esq., was born on the 18th of May, 1781, at Norwich. He was the second son (of a family of seven) of John Taylor, wool-comber, and Susan Cooke, and great-grandson of Dr. John Taylor, the author of the celebrated 'Hebrew Concordance.' His education was received at a day-school in Norwich, kept by the Rev. John Houghton, whom he describes as an excellent grammarian and a severe disciplinarian. Under this able tutor and his son, he made early and considerable progress in classical learning, and also acquired some knowledge of chemistry and other branches of natural philosophy. It seems to have been the wish of the master that his pupil should proceed to the High School of Glasgow (where he had himself received his education), and there qualify himself for the ministry; but other counsels prevailed, and, principally at the suggestion of Sir James Edward Smith, the founder of the Linnean Society, and a very intimate friend of his parents, he was induced to adopt the profession of a printer—a profession to which he became ardently attached. On Sir James Smith's recommendation, he was apprenticed to Mr. Davis of Chancery Lane, London, a printer of eminence, from whose press issued many scientific works of importance. During this period of his life, his leisure hours seem to have been employed in the study not only of the classics, but also of the mediæval Latin and Italian authors, especially the poets, of whose writings he formed a curious collection. From these, his "old dumps" as he was wont to call them, he derived great pleasure to the last moments of his life. He also became a proficient scholar in French, Flemish, Anglo-Saxon, and several of the

kindred Teutonic dialects,—a proficiency which afterwards proved of eminent utility in his professional career, by far the greater number of the Anglo-Saxon works, and works connected with that branch of literature, published in London during the last forty years, having issued from his press.

On the expiration of his apprenticeship, he carried on business for a short time in Chancery Lane, in partnership with a Mr. Wilks; but on his birthday in the year 1803, at the age of twenty-two, he established himself, in partnership with his father, in Blackhorse Court, Fleet Street, from whence he soon after removed to Shoe Lane, and subsequently to Red Lion Court. His press speedily became the medium through which nearly all the more important works in scientific natural history were ushered into the world; and the careful accuracy by which all its productions were distinguished led to a rapid extension of its use. It was immediately adopted by the Linnean Society; the Royal Society and many other learned bodies succeeded; individual members naturally followed the example of the Societies to which they belonged; and the same valuable qualities which had rendered it so acceptable to men of science were equally appreciated by those engaged in other pursuits. The beautiful editions of the Classics which proceeded from it, soon rendered his favourite device (the lamp receiving oil, with its motto of "*Alere flammam*") as familiar to all who had received a classical education in England as it had been from the beginning to the world of science. It would be tedious to enumerate even the more important of these works; but there is one in all respects so remarkable as to deserve especial mention. This is the facsimile of the Psalms from the Codex Alexandrinus, edited by the Rev. H. H. Baber, "at whose chambers in the British Museum," says Mr. Taylor in his Diary, under date of the 11th Nov. 1811, "I have collated the proofs of the first and second sheets with the Codex letter by letter, and I intend, if possible, to do the same for all the rest." A more striking proof could not be adduced of his strict attention to the accuracy of his press, and of his persevering devotion even to the minutest duties of his profession. It was by such means, aided by his high moral worth, that he nobly sustained the credit of the profession to which his abilities were devoted, and deservedly acquired the friendship, esteem, and confidence of the large circle of eminent men with whom it brought him into constant and familiar intercourse.

In the year 1807 he became a Fellow of the Linnean Society,

and at the anniversary of 1810 he was elected Under-Secretary, an office which he retained for nearly half a century, and in which he earned for himself the cordial esteem and good-will of every member of the Society. In his Diary, under date of the anniversary of 1849, he notes that he had "served with McLeay, Bicheno, Dr. Boott, and Mr. Bennett, under the successive presidencies of the founder Sir J. E. Smith (the intimate and dear friend of my parents and my warm friend), of the Earl of Derby, the Duke of Somerset, and my excellent friend Dr. Stanley, Bishop of Norwich." To the names of the Presidents he might subsequently have added those of Mr. Brown and Mr. Bell; and he must have felt, though he was too modest himself to note it down, how highly he was esteemed by them all for his strict sense of honour, the amiability of his disposition, and his entire devotion to the interests of the Society.

Among the numerous other learned bodies of which he was a member, the Society of Antiquaries, the Astronomical Society, and the Philological were those in which he took the deepest interest. He also attached himself from its commencement to the British Association for the Advancement of Science, nearly all the meetings of which, while his health permitted, he regularly attended. At these pleasant gatherings of the scientific world, in the society of his numerous friends and of those whose names were most distinguished in science, many of the happiest days of his life were passed.

In 1822, he joined Dr. Tilloch as editor of the 'Philosophical Magazine,' with which Dr. Thomson's 'Annals of Philosophy' were subsequently incorporated. In 1838 he established the 'Annals of Natural History,' and united with it, in 1841, Loudon and Charlesworth's 'Magazine of Natural History.' He subsequently (at the suggestion and with the assistance of some of the most eminent members of the British Association) issued several volumes of a work intended especially to contain papers of a high order of merit, chiefly translated, under the title of 'Taylor's Scientific Memoirs.' But his own principal literary labours were in the field of biblical and philological research. In 1829 he prepared a new edition of Horne Tooke's 'Diversions of Purley,' which he enriched with many valuable notes, and which he re-edited in 1840. In the same year (1840), Warton's 'History of English Poetry' having been placed in his hands by Mr. Tegg, the publisher, he contributed largely, in conjunction with his friends Sir F. Madden, Benjamin Thorpe, J. M. Kemble, and others, to

improve the valuable edition published in 1824 by the late Mr. Richard Price.

For five-and-thirty years he represented the ward of Farringdon Without (in which his business premises were situated), in the Common Council of the City of London, and constantly paid strict attention to his representative duties. Of all the objects which came under his cognizance in this capacity there were none which interested him more deeply than questions connected with education. He took an active part in the foundation of the City of London School, and the formation of the Corporation Library; and warmly promoted the establishment of University College and of the University of London. His politics were decidedly liberal; but his extended intercourse with the world, and the natural benevolence of his character, inclined him to listen with the most complete tolerance to the opinions of those who differed from him; and he reckoned among his attached friends many whose political opinions were strongly opposed to his own.

Early in the summer of 1852 his health gave way, and he found it necessary to withdraw from the excitement of active life. He settled down at Richmond, and once more gave himself up to Ovid, Virgil, and his old friends Paulus Manutius, Justus Lipsius, Ochinus, Fracastorius, &c. Increasing years brought increasing feebleness; and the severe weather of November last brought on an attack of bronchitis, of which he died suddenly on the 1st of December, in the 78th year of his age.

The Society has to record the loss, at a very advanced age, of one among the oldest of its members, in the death of *Dawson Turner, Esq.*, which took place at Brompton on the 20th of June in the last year. He was born at Great Yarmouth, on the 18th of October, 1775, and was the eldest son of Mr. James Turner, banker, in that place, by Miss Elizabeth Cotman, of Ormesby, Norfolk. For his classical attainments Mr. Turner was mainly indebted to his private tutor, the Rev. Robert Forby, of Forncet, Norfolk. He entered, indeed, at Pembroke College, Cambridge, of which his uncle, the Rev. Joseph Turner, Dean of Norwich, was master; but instead of continuing his studies at the University, he was called, by the death of his father, to take, at a very early age, an active part in the well-known bank of Gurneys and Turner, Great Yarmouth. Mr. Turner's love of literature and of languages, especially Latin and Greek, Italian and German, in all of which he was a great proficient, never forsook him; and to these he added, successively, various other pursuits, indicative

of a highly cultivated mind, and all of which he followed with much enthusiasm and success. His early residence in the country, and in a district abounding with wild plants, and the fact of his tutor's partiality to botany (as testified by Sir James Smith, when dedicating a new species of Willow (*Salix Forbyana*) to him), gave him a taste for Natural History in general, and especially for collecting and investigating the vegetable productions of the neighbourhood. This branch he studied with great ardour; and, nothing deterred by the difficulty of the subject, after attaining a competent knowledge of British Phænogamous plants, he devoted his attention to the *Cryptogamia*. Perhaps in consequence of his residence upon the sea-coast, Mr. Turner was chiefly attracted by the *Algæ*; and there cannot be a doubt that his 'Synopsis of the British Fuci,' published in 1802, contributed largely to encourage the study of the sea-weeds of our own islands, by the accuracy of its descriptions, and, being written in a popular form, by the elegance of the composition.

The 'Synopsis of British Fuci' was quickly followed, in 1804, and after a tour in Ireland which afforded a rich harvest of Mosses, by his 'Muscologiæ Hibernicæ Spicilegium,' with 16 coloured plates of new species, the descriptions and preface written entirely in Latin.

Mr. Turner's third botanical work was prepared in conjunction with his late intimate friend, Lewis Weston Dillwyn, Esq., of Swansea, and was entitled "The Botanist's Guide through England and Wales," in 2 vols. 8vo: it was the result of many botanical tours in various counties, and of communications of notes and specimens from numerous correspondents. His object was now to undertake a general history of sea-weeds, foreign as well as British, with coloured figures of all the species, and full descriptions in Latin and English, entitled "Fuci, sive Plantarum Fucorum Generi a Botanicis ascriptarum Icones, Descriptiones et Historia." It was undoubtedly the most distinguished and laboured of all his publications—commenced in 1808 and concluded in 1819, in four volumes, large quarto and folio, with 258 plates, many, and those the best of them, from the pencil of his accomplished lady, Mrs. Turner. This valuable and highly meritorious work, unfortunately for botany, and unfortunately for Mr. Turner's rising fame in that direction, was the last he ever published on a science he fondly loved and continued to love and to talk of with more pleasure than on any other subject, so long as his declining faculties permitted him. He apologizes, in the closing page of

the 'Fuci,' for bringing the book to a conclusion in such an imperfect state. "It is," he says, "principally attributable to the more than usual progress made of late years in the knowledge of this branch of Natural History, which, by the numerous expeditions in quest of science, has been extended to such a degree that it is difficult to imagine what number of species may ultimately be found; so that, though the present publication has already far exceeded the limits originally contemplated, it ends incomplete, leaving the feeling that our knowledge is in its infancy, and that, till more is seen, the point which the author had principally in view, that of reducing the marine species in general under natural families, in a well-organized system, cannot be satisfactorily accomplished. Various attempts have, meanwhile, been made to bring this interesting tribe of plants under a new arrangement; and one in particular, by M. Lamouroux, embracing a comprehensive view of the subject, is entitled to great credit. To these, however, the author is not ambitious of adding, but rather finds satisfaction in taking leave of his readers, with the consciousness of having laid before them a set of figures upon the accuracy of which they may rely, and which, as representations of things that are, will, through every change of human opinions, retain an undiminished value, while they may serve, in the hands of some abler and more fortunate successor, as the ground-work of that which he had hoped to have accomplished himself." Such successors (and Mr. Turner lived to hail the results of their systematic labours) have been found in Agardh and Harvey, who have not failed to record their obligations to the work thus briefly noticed.

The above-mentioned publications constitute, however, but a small part of the services rendered to botany by Mr. Turner, as Sir James Smith's 'English Botany,' and 'Flora Britannica' and 'English Flora,' and, we may add, the volumes of our own Transactions can testify: he did still more, by encouraging in the pursuit of science every young Naturalist who came in his way, welcoming him to his table, assisting him by the use, and often by presents, of books, and by advice and money, if needed. He possessed an extensive library, rich in works on the Fine Arts and Literature, as well as in Botanical publications. He joined with Mr. Borrer, so well known in our Society, in the preparation of a work upon Lichens, of which only a small portion was printed, for private circulation, extending to 167 pages, under the title of 'Lichenographia Britannica,' but which, if continued as it was

begun, would have reflected great credit on both the individuals concerned in it. The removal of more than one friend of congenial tastes from the vicinity of Yarmouth contributed perhaps to lessen Mr. Turner's devotion to the study of plants.

But a mind so highly cultivated and endowed as his was, with a degree of health and strength of physical and intellectual powers beyond most men, would not suffer him to allow the time which could be spared from business to pass unemployed. Besides general literature, he studied and collected pictures, coins, medals, autographs of sovereigns and distinguished people, antiquities, county histories (that of his native county, Norfolk, above all), to an extent which need not be further alluded to here, but which is fully acknowledged by all who have been interested in such pursuits. From his earliest career, and for a period of nearly sixty years, he carried on a most extensive literary and scientific correspondence, all of which he preserved and arranged chronologically. Could those letters from the numerous and eminent European botanists of the time be collected together, they would contribute much information on the state of natural science during the first twenty years of the present century, including the period of the last twenty years of the lives of Sir Joseph Banks, and of the first President of our Society, Sir James Smith. Indeed, Mr. Turner long meditated, but never accomplished, the publication of a memoir of our great Mæcenas, intending it to comprise a history of the progress of botany up to the death of that distinguished man.

Mr. Dawson Turner was in his 83rd year at the time of his decease: the grave closed over him and Robert Brown within a few days of each other,—the one a zealous, and for a while indefatigable, and the last of the botanists of the old or Linnean school; the other the most distinguished promoter of the new or Jussieuan method.

Mr. Turner became a Fellow of the Linnean Society in 1797, and had been upwards of 61 years a member at the time of his decease. The following is a list of his Papers in our 'Transactions':—

Calendarium Plantarum Marinarum.—Vol. v. p. 126.

Descriptions of four new species of *Fucus*.—Vol. vi. p. 125.

Descriptions of four new British Lichens.—Vol. vii. p. 86.

Remarks upon the Dillenian Herbarium.—Vol. vii. p. 101.

Description of a new species of Lichen.—Vol. viii. p. 260.

Descriptions of eight new British Lichens.—Vol. ix. p. 135.

And in conjunction with Mr. James Sowerby,

Catalogue of some of the more rare plants observed in a tour through the Western Counties of England, made in June 1799.—Vol. v. p. 234.

The following Notices relate to the eminently distinguished men whose places have become vacant in the list of our *Foreign Members*:—

Carl Adolph Agardh, Bishop of Carlstad and Knight of the Polar Star, distinguished as a botanist, a statesman, and a theologian, was the son of a shopkeeper in the town of Bartad, in the Swedish province of Halland, where he was born on the 23rd of January, 1785. He became, in 1799, a student of the University of Lund, and published his inaugural dissertation, entitled "*Cari-cographia Scanensis*," in 1806. In the following year, at the age of two-and-twenty, he was appointed Professor of Mathematics; but his scientific studies continuing to take the direction indicated by his earliest work, he proceeded to Stockholm, where, under the superintendence of Swartz, he devoted himself to the study of Cryptogamic plants. After making a tour through Denmark, Northern Germany, and Poland, he returned to Lund, and in 1812 became Professor of Botany and Practical Economy in that University. In 1816 he took holy orders, and was immediately named pastor of St. Peter's Kloster; and in the diets of 1817, 1823, and 1834, he sat as deputy for his diocese. In 1821, he undertook a scientific journey through Denmark, Germany, Holland, and France; and in 1827 he travelled through part of Germany and Italy. During all this period he was actively engaged in the publication of his botanical labours, especially in reference to the family of *Algæ*, a group of plants which, by his persevering and successful investigation, he made peculiarly his own, and the systematic arrangement of which he entirely remodelled. He was chosen a Member of the Royal Academy of Sciences at Stockholm in 1818; in 1824 he was decorated with the Order of the Polar Star; and in 1825 he was called to Stockholm as a member of the great Committee then formed for the organization of a new system of public instruction. In 1833, he paid a visit to England, and in the same year he was elected a Foreign Member of the Linnean Society. On his elevation to the bishopric of Carlstad in the following year, he resigned his Professorship in the University; and from this time forward he almost ceased his botanical labours, devoting himself chiefly to his public and religious duties. His

principal botanical works are his "Dispositio Algarum Sueciæ," Lund, 1810-12; "Algarum Decades i.-iv.," Lundæ, 1812-15; "Synopsis Algarum Scandinaviæ," Lundæ, 1817; "Aphorismi Botanici," Lundæ, 1817-25; "Icones Algarum Ineditæ," Lundæ, 1820-22; "Species Algarum ritè cognitæ," Gryphiæ, 2 vols. 1823-28; "Systema Algarum," Lundæ, 1824; "Classes Plantarum," Lundæ, 1825; "Icones Algarum Europæarum," Leipzig, 1828-35, and "Lärobok i Botanik," Malmö, 2 vols. 1829-32, the last translated into German under the title of "Lehrbuch der Botanik," Kopenhagen, 1831-32. Among the eminent men whom Sweden has produced since the days of Linnæus, Bishop Agardh unquestionably takes a very high rank. In investigation he was laborious and accurate, in his views of arrangement careful and clear-sighted, in his speculations bold and frequently successful. His writings on mathematics and political economy are not within our sphere; but they are spoken of by his countrymen as valuable and instructive contributions to the sciences to which they relate. Of his extensive acquirements, of the frankness of his manners, and the kindness of his disposition, there are many among us who retain a vivid recollection. He married Charlotta Lindskog, the daughter of a tradesman in Lund, and died at Carlstad on the 28th of January last, having just completed his 74th year, leaving one son, Jacob Georg, who, following in the footsteps of his illustrious father, has earned for himself high distinction among the cultivators of botanical science.

Aimé Bonpland, the companion and friend of Humboldt, was born at Rochelle on the 22nd of August, 1773, and was educated for the medical profession. In the spring of 1798, when Alexander von Humboldt visited Paris, he found Bonpland, then one of the most promising students of the École de Médecine and of the Jardin des Plantes, busily preparing, in company with Michaux, to take part under Captain Baudin in a Voyage of Discovery to South America. With this enterprise he eagerly associated himself, and soon became warmly and intimately attached to the companions of his intended voyage, and especially to Bonpland. The expedition, however, being set aside for want of funds, the two friends, after a fruitless attempt to join the *corps* of French *savans* then assembled in Egypt, determined to pass the winter together in Spain, and in January 1799 proceeded to Madrid. Here, through the intervention of the Saxon minister, they were introduced to the king, by whose orders every possible facility was afforded them for prosecuting that extensive journey through the Spanish domi-

nions in Mexico and South America, which now presented itself to their minds as the most suitable means of satisfying their ardent desire for scientific travel and research, and on which they embarked at Corunna in May 1799. It is needless to follow the steps of the distinguished travellers through this celebrated journey, the immense results of which have been made known in a multitude of splendid publications, forming the most elaborate and magnificent series that have ever arisen out of a single undertaking. It may be sufficient to say that the botanical collections alone, with which Bonpland chiefly concerned himself, amounted to upwards of 6000 species, and were published partly in the "*Plantas Equinociales*," 2 vols. fol., Paris, 1808-9; in the "*Monographia Melastomacearum*," 2 vols. folio, 1806-23; and, with the cooperation of Kunth, in the "*Nova Genera et Species Plantarum Americæ Equinoctialis*," 7 vols. folio, Paris 1815-25; in a "Synopsis" of the same work in 4 vols. 8vo, Paris, 1822-25; in the "*Mimoses et autres Plantes Légumineuses*," fol. Paris, 1819-24; and in the "*Distribution Méthodique des Graminées*," 2 vols. fol. Paris, 1835. The travellers arrived at Bordeaux on their return to Europe in August 1804, having been absent rather more than five years; and for the next twelve years Bonpland resided in or near Paris, busied in the arrangement of the collections, and in superintending the various publications connected with them. Soon after his arrival in France he was appointed to the charge of the Botanic Garden maintained by the Empress Josephine at Malmaison, and published in connection with it a splendid work, entitled "*Description des Plantes rares cultivées à Navarre et à Malmaison*," fol. Paris, 1813-17. On the fall of the Emperor Napoleon, however, his passion for foreign travel appears to have revived; and in 1818 he again quitted Europe, with the title of Professor of Natural History at Buenos Ayres. Here he did not long continue in a state of repose, but commenced in 1820 a new journey into the interior, with a visit to a colony of Indians which he had founded at Santa Anna on the banks of the River Paraguay, for the purpose of cultivating the Yerva de Paraguay, or Paraguay Tea, regarded throughout South America almost in the light of one of the necessities of life. At this place he was seized and made prisoner by the orders of Dr. Francia, who had founded in Paraguay a singular dictatorship on the ruins of the Jesuit power in that province, and who totally destroyed the plantations made by Bonpland, with the view of securing to himself the monopoly of the cultivation to which they were devoted. By his orders Bonpland was carried to

Santa Martha, in which place he was restored to partial liberty, and permitted to act as a kind of garrison-physician to the dictator's troops. It was not until 1829 that, after the strongest instances, he was permitted to return to Buenos Ayres, when his friends warmly welcomed his restoration to liberty, under the hope that he would immediately return to European society. In this expectation, however, they were disappointed: it would appear that his long residence in South America had generated a preference for his adopted country, in which he remained until his death. This event took place at St. Francisco de Borja, a small Brazilian town on the eastern borders of Entre Rios, at no great distance from Uruguay, where he had resided since 1831. He died on the 4th of May in the year 1858, in the 85th year of his age, leaving behind him so high a character, not only as a talented and accomplished naturalist, but as an amiable and estimable man, that the British community at Buenos Ayres determined to erect a suitable monument to his memory. He was unquestionably one of the most distinguished men belonging to what Prof. von Martius has aptly denominated the peripatetic age of botany; and his death, at so great a distance both of time and space from the scene and period of his active labours, warns us strongly how few are the links that still remain to bind us to that interesting and important epoch in the history of botanical science.

I had written the last sentence—one as it would almost appear of melancholy foreboding—on the morning of the day on which the evening papers brought us the sudden and unexpected intelligence of the death of *Baron Alexander von Humboldt*, the friend of Robert Brown, the still more intimate friend of Bonpland, and the oldest survivor of that generation of inquirers into nature, who commencing their investigations before the close of the last century, have continued them through more than half of the present. This event completing the muster-roll of illustrious names of whom death has deprived us during the past year, has come upon us so suddenly and so recently that I must entreat the pardon of the Society if I fail to pay a fitting tribute of respect to the memory of one so eminently distinguished, not only in the sciences which we especially cultivate, but in every science connected with the great and comprehensive study of nature in its widest sense. To attempt, within the short space of time which I could command, to give the merest outline of his labours and of his merits, would be in the highest degree presumptuous. I feel too, that the task of doing justice to the character of so great a man will naturally fall

to hands far abler than my own; and to those hands I cheerfully resign it. I will therefore only add that Alexander von Humboldt was born at Berlin on the 14th of September, 1769, was elected one of the eight Foreign Associates of the Academy of Sciences of the Institute of France, in the place of Cavendish, in 1810, became a Foreign Member of the Royal Society in 1815, and a Foreign Member of the Linnean Society in 1818, and died at Berlin on the 6th of May in the present year, in the 90th year of his age.

Lastly, we have to record the deaths of two of our *Associates*:—

Mr. Samuel Stutchbury was the son of a dealer in mathematical instruments in the City of London, and early attached himself to Natural History pursuits. In 1825 he was engaged, in the capacity of Natural History collector, to accompany an expedition fitted out for the purpose of fishing for Pearls in the Pacific Ocean, and soon after his return became Curator of the Bristol Philosophical Institution, which office he retained for many years. In 1842 or 1843 he went out to New Holland with a geological appointment, and returned about two years ago, bringing with him considerable collections in various departments of Natural History. He was elected an Associate of the Linnean Society in 1828, and contributed two Papers to our 'Transactions;' one entitled "An Account of the Mode of Growth of Young Corals of the genus *Fungia*," vol. xvi. p. 493; and the other, a "Description of a new species of the genus *Chamaeleon*," vol. xvii. p. 361. Besides these, he was author of the six following Papers:—1. "On two new genera of Testaceous Mollusca," *Zool. Journ.* v. p. 95; 2. "On *Cypræacassis*," *Mag. Nat. Hist.* ser. 2. i. pp. 214, 470; 3. "On a new fossil *Avicula*," *Ibid.* ii. p. 163; 4. "On a new genus of Fossil Bivalve Shells (*Pachyodon*)," *Ann. and Mag. Nat. Hist.* viii. p. 481; 5. "On a new Sponge from Barbadoes (*Dactylocalyx pumiceus*)," *Proc. Zool. Soc.* ix. p. 86; 6. "On a new species of *Plesiosaurus* in the Museum of the Bristol Institution," *Journal of the Geological Society*, ii. p. 411. Of the last-named Society he was a Fellow. He returned from Australia in dilapidated health, and died at Bristol on the 12th of February in the present year, at the age of 61.

Of *Mr. Thomas Turner*, of Eton College, I only know that he was elected in 1832, and died in the autumn of 1858.

At the Election which subsequently took place, Thomas Bell, Esq., was re-elected President; Francis Boott, Esq., M.D., Treasurer; John Joseph Bennett, Esq., Secretary; and George Busk, Esq., Under- (Zoological) Secretary. The following five Fellows were elected into the Council in the room of others going out: viz., Frederick Currey, Esq., F.R.S.; Prof. Grant, F.R.S.; Thomas Corbyn Janson, Esq.; Prof. Lindley, F.R.S.; and Sir Charles Lyell, F.R.S.

The President nominated George Bentham, Esq., Francis Boott, Esq., M.D.; Richard Owen, Esq., D.C.L.; and William Wilson Saunders, Esq., Vice-Presidents for the ensuing year.

Among the presents announced, was that of an extensive series of conchological works not previously existing in the Society's Library, presented by Hugh Cuming, Esq., F.L.S., to whom the special thanks of the Society were directed to be offered for his valuable present.

June 2nd, 1859.

Thomas Bell, Esq., President, in the Chair.

William Camps, Esq., M.D., was elected a Fellow.

Read, first, "Notes on *Homalium*;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iv. p. 31.)

Read, secondly, a "Revision of *Dalbergiæ*;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iv. p. .)

Read, thirdly, a Letter from Charles Knight, Esq., F.L.S., "On the Common Slug of New Zealand." (See "Transactions," vol. xxii. p. .)

Read, fourthly, a "Catalogue of the Dipterous Insects collected by Mr. A. R. Wallace at Makassar in the Island of Celebes;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. iv. p. 90.)

Read, fifthly, a second Letter from Mr. Charles Barter on the Vegetation of Western Africa, addressed to Sir W. J. Hooker, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. 23.)

June 16th, 1859.

Thomas Bell, Esq., President, in the Chair.

Edward Bradford, Esq.; the Venerable Archdeacon Hale; M. H. Lackersteen, Esq., M.D.; J. T. Llewelyn, Esq.; Dr. George Rolleston; and David Williams, Esq., were elected Fellows.

The special thanks of the Society were ordered to be given to the President for his present of a valuable series of physiological works, not previously in the Society's Library.

Read, first, a "Revised Synopsis of the *Distomidæ*;" by T. Spencer Cobbold, Esq., M.D., F.L.S. (See "Zoological Proceedings," vol. iv. p. .)

Read, secondly, a Memoir "On the structure of the Pitcher in the genus *Nepenthes*; with the description of several new species from Borneo;" by Joseph Hooker, Esq., M.D., F.R.S., F.L.S. (See "Transactions," vol. xxii. p. .)

Read, thirdly, a "Synopsis of the Indian species of *Impatiens*;" by J. D. Hooker, Esq., M.D., F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. .)

Read, fourthly, a "Description of a New Genus of *Balanophoræ*;" by Dr. Hooker. (See "Transactions," vol. xxii. p. .)

Read, fifthly, a "Description of the genus *Propiera* of Bouton;" by Dr. Hooker. (See "Botanical Proceedings," vol. iv. p. .)

Read, sixthly, Notes "On *Leopoldinia Piassaba*, Wallace;" by Richard Spruce, Esq. Communicated by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. iv. p. 58.)

Read, seventhly, a Notice "On the cultivation of the Cocoa-nut in Ceylon;" by the Rev. Thomas Foulkes, in a letter to Sir W. J. Hooker, F.R.S., F.L.S.

Read, eighthly, a Memoir "On the Embryogeny of Endogens;" by Benjamin Clarke, Esq., F.L.S. (See "Transactions," vol. xxii. p. .)

Read, ninthly, "Miscellaneous Notes on Various Plants;" by Benjamin Clarke, Esq., F.L.S. (See "Transactions," vol. xxii. p. .)

Read, tenthly, a "Memoir "On East Indian Salices;" by Prof. N. J. Andersson. Communicated by Joseph Hooker, Esq., M.D., F.R.S., F.L.S. See "Botanical Proceedings," vol. iv. p. 39.)

ADDITIONS

TO THE

LIBRARY OF THE LINNEAN SOCIETY.

RECEIVED FROM JULY 1, 1858, TO JUNE 30, 1859.

[Continued from Vol. III. page lxxi.]

TITLES.

DONORS.

ACADEMIES and SOCIETIES.

Amsterdam :—

Kon. Akademie van Wetenschappen.

Verhandelingen, deel 4-6. Amsterdam, 1857-58, 4to.

Verslagen en Mededeelingen. Afdeeling *Natuurkunde*,
deel 7. *Ib.* 1857-58, 8vo.

— — — Afdeel. *Letterkunde*, deel 3. *Ib.* 1857-58, 8vo.

Jaarboek voor 1857. *Ib.* 8vo.

Catalogus van de Boekerij der Akademie, deel 1, st. 1. *Ib.*
1857, 8vo. THE ACADEMY.

K. Zoologisch Genootschap, "Natura Artis Magistra."

Bijdragen tot de Dierkunde, 7^{de} Aflevering. 1858, 4to.

THE SOCIETY.

Basel :—Naturforschende Gesellschaft. Verhandlungen, Theil 2,

Heft 1. Basel, 1858, 8vo.

THE SOCIETY.

Batavia :—Bataviaasch Genootschap van Kunsten en Weten-
schappen.

Verhandelingen; deel 26. Batavia, 1854-57, 4to.

Tijdschrift voor Indische Taal-, Land-, en Volkenkunde;
deel 6. *Ib.* 1856-57, 8vo.

THE SOCIETY.

Berlin :—

Königl. Akademie der Wissenschaften.

Abhandlungen aus dem Jahre 1857. Berlin, 1858, 4to.

Monatsbericht, von Januar—Dec. 1858. *Ib.* 1858-59, 8vo.

THE ACADEMY.

Meteorologisches Institut. Uebersicht der Witterung in

Nördl. Deutschland. Jahrg. 1855-58. Berlin, 4to.

THE R. ACAD. OF SCIENCES, BERLIN.

TITLES.	DONORS.
ACADEMIES and SOCIETIES (<i>continued</i>).	
Berlin (<i>continued</i>) :—	
Verein zur Beförderung des Gartenbaues in den K. Preussischen Staaten. Verhandlungen, Neue Reihe, Jahrg. 5, Heft 1-3, and Jahrg. 6, Heft 1. Berlin, 1857-58, 8vo.	THE SOCIETY.
Berwickshire Naturalists' Club. Proceedings, vol. 4, no. 2. London, 1858, 8vo.	THE CLUB.
Bonn :—Naturhistorischer Verein. Verhandlungen, Jahrg. 14, Heft 2 & 3, and Jahrg. 15. Bonn, 1857-58, 8vo.	
Boston :—	THE ASSOCIATION.
American Academy of Arts and Sciences. Proceedings, vol. 3, sheets 32-52, and vol. 4, nos. 1-11. Boston and Cambridge, 1857-58, 8vo.	THE ACADEMY.
Society of Natural History. Journal, vol. 6, no. 4. Boston, 1857, 8vo.	
Proceedings, vol. 6, sheets 11-22. <i>Ib.</i> 1857-58, 8vo.	THE SOCIETY.
Breslau :—Imperial Academy "Naturæ Curiosorum." Nova Acta, vol. 26. Vratislaviæ et Bonnæ, 1857-58, 4to.	
Verzeichniss der Mitglieder der Akademie. <i>Ib.</i> 1858, 8vo.	THE ACADEMY.
Calcutta :—Asiatic Society. Journal, vol. 1 (wanting nos. 4, 5, & 9), vol. 2 (wanting nos. 16 & 17), and vols. 3-8. Calcutta, 1832-39, 8vo.	
W. W. SAUNDERS, Esq., F.R.S., V.P.L.S. — ——. Vols. 9-13; vols. 24-26, and vol. 27, nos. 1-4. <i>Ib.</i> 1840-58, 8vo.	THE SOCIETY.
Cambridge : — Philosophical Society. Transactions, vol. 10, part 1. Cambridge, 1858, 4to.	THE SOCIETY.
Canada :—Geological Survey. Report on its progress, for 1857. Toronto, 1858, 8vo.	SIR W. E. LOGAN?
Cherbourg :—Société Imp. des Sciences Naturelles. Mémoires, tome 5. Paris, 1858, 8vo.	THE SOCIETY.
Copenhagen :—Kongl. Danske Videnskabernes Selskab. Oversigt i aar. 1857. Kjöbenhavn, 8vo.	THE SOCIETY.
Cornwall :—R. Cornwall Polytechnic Society. Annual Report (25th). Falmouth, 1857, 8vo.	THE SOCIETY.
Dublin :—	
Geological Society. Journal, vol. 8. pt. 1. Dublin, 1858, 8vo.	THE SOCIETY.

TITLES.

DONORS.

ACADEMIES AND SOCIETIES (*continued*).Dublin (*continued*):—

Royal Dublin Society. Journal, nos. 9–13. Dublin, 1858–59, 8vo. THE SOCIETY.

University Zoological and Botanical Association. Proceedings, vol. 1, pt. 1. Dublin, 1858, 8vo. THE ASSOCIATION.

Edinburgh:—

Botanical Society.

Transactions, vol. 1, part 3; vols. 2, 3, 4, & 5; and vol. 6, part 1. Edinburgh, 1844–58, 8vo.

Annual Reports, 6, 7, & 8. *Ib.* 1844, 8vo.

Proceedings for the years 1855 & 56. *Ib.* 8vo.

THE SOCIETY.

Royal Society. Proceedings, no. 48. Edinburgh, 1857–58, 8vo. THE SOCIETY.

Frankfurt-a.-M.:—Senckenbergische Naturforschende Gesellschaft. Band 2, Heft 2. Frankfurt-a.-M., 1858, 4to.

THE SOCIETY.

Geneva:—Société de Physique et d'Histoire Naturelle. Mémoires, tome 14, partie 2. Genève, 1858, 4to. THE SOCIETY.

Giessen:—Oberhessische Gesellschaft für Natur- und Heilkunde. Bericht 7. Giessen, 1859, 8vo. THE SOCIETY.

Göttingen:—Königl. Gesellschaft der Wissenschaften. Nachrichten von 1857 und 1858. Göttingen, 8vo.

THE SOCIETY.

Lausanne:—Société Vaudoise des Sciences Naturelles.

Bulletin, tome 3, no. 26; tome 5, no. 42, and tome 6, no. 43.

Lausanne, 1858, 8vo.

Catalogue de sa Bibliothèque. *Ib.* 1858, 8vo.

THE SOCIETY.

Leeds:—Philosophical and Literary Society. Report (38th). Leeds, 1858, 8vo. THE SOCIETY.

Leyden:—Nederlandsche Entomologische Vereeniging. Tijdschrift voor Entomologie; onder Redactie van Prof. J. van der Hoeven, &c., deel 1, and deel 2, afl. 1 & 2. 'Sgravenhage en Leiden, 1857–58, 8vo. THE SOCIETY.

Liverpool:—Literary and Philosophical Society. Proceedings, no. 12. Liverpool, 1858, 8vo. THE SOCIETY.

London:—

Admiralty. Report on the Teneriffe Astronomical Experiment of 1856. By Prof. C. P. Smyth. London, 1858, 4to.

THE LORDS COMMISSIONERS OF THE ADMIRALTY.

TITLES.	DONORS.
ACADEMIES AND SOCIETIES (<i>continued</i>).	
London (<i>continued</i>) :—	
Art-Union.	
Report of the Council for 1858 : with a List of the Members.	
London, 1858, 8vo.	
Almanack for 1859. <i>Ib.</i> 12mo.	THE ART-UNION.
British Association. Report of the 27th Meeting. London,	
1858, 8vo.	THE ASSOCIATION.
British Pomological Society. Transactions, nos. 1–3. London,	
1855–57, 8vo.	THE SOCIETY.
Entomological Society. Transactions. New Series, vol. 4,	
parts 5–9, and vol. 5, part 1. London, 1857–59, 8vo.	
	THE SOCIETY.
Geological Society. Quarterly Journal, vol. 14, parts 3 & 4,	
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On the dermal armour of *Jacare* and *Caiman*, with notes on the Specific and Generic Characters of recent *Crocodylia*. By T. H. HUXLEY, Esq., F.R.S., F.L.S., Prof. of Nat. History, Gov. School of Mines.

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IN the course of a recent investigation into the nature of the singular extinct reptile, *Stagonolepis*, I was led to inquire somewhat minutely into the character of the exoskeleton, or dermal armour, of the existing *Crocodylia*. To my surprise, I found that very little detailed information on this subject was to be obtained from the standard repertories of Comparative Anatomy, or even from the special monographs on Crocodilian structure and classification; but I was still more astonished to discover, among whole genera of recent *Crocodylia*, an exoskeleton possessed of characters such as have been universally supposed to be peculiar to long extinct forms of the order, and whose existence in any recent species has hitherto, so far as I can ascertain, been completely overlooked.

The attempt to discover the limits within which this remarkable exoskeleton is to be found, led me to look, more critically than I had previously done, into the arrangement and specific characterization of the recent *Crocodylia*. I have thereby arrived at results which, imperfect as they are, may be of service by leading others to inquire into the exact characters of species not at present within my

reach; and I therefore propose to preface my account of the peculiarities of the exoskeleton in two of the genera of recent Crocodiles with some remarks on the classification of the group, and with a few notes upon the characters of the species and the limits of the genera.

Everyone is acquainted with the great improvement effected in this branch of Herpetology by Cuvier, who divided the Crocodiles, which he regarded as constituting only a single genus, into the three subgenera *Alligatores*, *Crocodili*, and *Longirostres*. Subsequent writers have admitted these highly natural subdivisions; but there has been a constant tendency to raise their rank. The genus *Crocodylus* has become the order *Crocodilia*; the subgenera *Alligatores*, &c., have been elevated into families; Dr. Gray has shown that the *Alligatores* must be divided into three genera, and that there are at least two genera of *Crocodili*; and, while one of Cuvier's species of *Longirostres* has been suppressed, the group is very generally retained with a changed name (*Gavialis*), a very important addition having been made to it in the *Crocodylus Schlegelii* of Müller and Schlegel.

Unless the considerable materials contained in the British Museum, the Hunterian collection, the collection of Dr. Grant, and the Christchurch Museum at Oxford had been freely placed at my disposal, I should have been wholly unable to acquire the information contained in the following pages. It is only right, therefore, that I should take this opportunity of offering my thanks to my friends Dr. Gray, Prof. Quekett, Dr. Grant, and Dr. Rolleston for the many facilities they have liberally afforded me.

The recent species of the order *Crocodilia* are divisible into three families, which correspond with the original subgenera of Cuvier, and may be termed the *Alligatoridæ*, the *Crocodilidæ*, and the *Gavialidæ*.

I. In the *ALLIGATORIDÆ* the teeth are strong and unequal, and the posterior ones differ greatly in shape from the anterior. The anterior pair of mandibular teeth, and the fourth pair (or the so-called canines) are received into pits in the margins of the premaxilla and maxilla; while the mandibular teeth behind these pass inside, and not between, the maxillary teeth. The mandibular symphysis does not extend back beyond the level of the fifth tooth, and often not nearly so far. The line of the premaxillo-maxillary suture on the palate is straight, or convex forwards. The wide posterior nares look downwards, and are situated forwards on the palate.

This family embraces three genera, readily distinguishable by osteological characters—*Alligator*, *Caiman*, and *Jacare*.

Genus 1. ALLIGATOR.

Dental formula, $\frac{20-20}{20-20}$. 9th maxillary tooth the largest of its series. The snout is very broad, flattened, and rounded at the end. There is an indistinct longitudinal interorbital ridge; and there are two short ridges along the line of junction of the prefrontal and lachrymal bones. The aperture of the external nares is divided into two parts, by the prolongation forwards of the nasal bones. The supra-temporal fossæ are well-marked and open, though not large. The vomers do not appear in the palate. The feet are well webbed. The dorsal bony scutes are not articulated together; and there are no ventral scutes.

This genus contains only one species, the well-known *Alligator Mississippiensis*, or *lucius*, which is exclusively North American.

Cuvier (Oss. Foss. ed. 4. vol. ix. p. 211) gives the appearance of the vomer in the palate as a general character of the *Alligatores*; but this bone is not visible in the palate of any of those *Alligatores* which Cuvier would have referred to his *A. lucius* or *A. palpebrosus*, and which form the genera *Alligator* and *Caiman* as here defined. The vomers are in fact as slender and delicate as in the Crocodile, and extend only between the level of the tenth maxillary tooth anteriorly and the descending processes of the prefrontal posteriorly.

What may be called the median nares, or the arch formed by the postero-lateral part of the vomer and the anterior and superior lamina of the palatine bone on each side (which would constitute the posterior boundary of the posterior nares, if the palatine and pterygoid bones gave off no inferior or palatine processes), are situated nearly on a level with the twelfth tooth, or with the palato-maxillary suture.

Genus 2. CAIMAN.

Dental formula $\frac{20-20}{22-22}$ (Natterer). The face is without median or transverse ridges, but it is sharply angulated along a line which extends from the orbit forwards along the sides of the snout. The anterior nasal aperture is undivided in the dry skull. The vomers do not appear in the palate. The supra-temporal fossæ are obliterated, the circumjacent bones uniting over them. The webs of the feet are rudimentary. The dorsal scutes are articulated together by lateral sutures and anterior and posterior facets; and there is a ventral shield, consisting of similarly articulated scutes.

Natterer* has described three species of *Caiman*—*C. palpebrosus*, *C. trigonatus*, and *C. gibbiceps*. The Caimans abound chiefly in tropical South America; but they are found as far north as Mexico, a specimen of *C. palpebrosus* in Dr. Grant's collection coming from that country.

Genus 3. JACARE.

The snout is broad, and rounded at the end†. Each prefrontal bone is traversed close to its anterior extremity by the ends of a strong transverse ridge, which then curve round and pass forwards on the lachrymal and maxillary bones, to subside opposite the ninth tooth. The anterior nasal aperture is not divided by bone. The vomers, separated by a longitudinal suture, appear in the palate between the premaxillaries and the palatine plates of the maxillaries. The temporal fossæ, though not large, are open. The webs of the feet are small. The dorsal scutes are articulated together, as in the preceding genus; and there are similarly-articulated ventral scutes. There are 18–20 teeth on each side, above and below; and the fourth tooth in the upper jaw is the largest. The mandibular symphysis extends back nearly to the fifth tooth.

In a skull of *Jacare (fissipes?)*, 19 inches long, in the British Museum, I find that part of the vomer which is visible in the palate to be a rhomboidal plate, somewhat truncated anteriorly, and rather more than $1\frac{1}{2}$ inch long and 1 inch wide. Its anterior end comes within $\frac{3}{8}$ ths of an inch of the posterior margin of the anterior palatal foramen. Its posterior margin reaches to the level of the eighth tooth. The visible portion of each vomer is only its anterior end, which forms a thick and solid wedge-shaped plate, broader in front than behind, and articulating by a rough anterior and outer face with the premaxilla, by an obliquely ridged posterior and outer face with the maxilla, and by its internal face with its fellow. Its upper, rounded surface projects but little into the nasal passage. $2\frac{1}{4}$ inches behind its anterior end, the posterior and upper extremity of the vomer passes into a thin and narrow plate of bone, whose plane is at first inclined at an angle of 45° to that of the anterior part of the bone, but gradually becomes vertical; as it does so it deepens, until, 3 inches behind

* "Beitrag zur näheren Kenntniss der Sudamerikanischen Alligatoren,"
'Annalen des Wiener Mus.,' Band i.

† According to Natterer, the dental formula of *J. nigra* and *J. fissipes* is
 $\frac{18-18}{18-18}$, of *J. sclerops* $\frac{19-19}{20-20}$, of *J. vallifrons* and *J. punctulata* $\frac{20-20}{18-18}$.

the anterior extremity, the vomer is a thin vertical plate of bone, $\frac{5}{8}$ ths of an inch deep, which articulates below with the palatine plate of the maxilla, and, about 1 inch behind this, with the palatine plate of the palatine bone. The upper edge of this plate nowhere extends to one-third of the height of the nasal chamber. It gives off a horizontal process outwards, which, gradually increasing in width, inclines downwards until it comes into contact, first, with the inner surface of the maxilla, and, $\frac{3}{4}$ ths of an inch behind this, with the nasal plate of the palatine bone. In front of its junction with the maxilla, the horizontal plate of the vomer presents a long free edge, concave externally; and this bounds the median nares internally and posteriorly. Throughout its junction with the maxilla, the horizontal plate is parallel-sided; but after it joins the palatine bone, it gradually narrows posteriorly, in consequence of the gradual increase in width of the palatine, and ends almost in a point, $6\frac{1}{4}$ inches behind its anterior end. The posterior edge of the vertical plate is extremely thin, and $\frac{7}{8}$ ths of an inch deep. It articulates with the anterior end of the vertical plate of the pterygoid, while the straight inferior edge articulates throughout with the palatine plate of the palatine bone. The vomers terminate midway between the median nares and the descending process of the prefrontal. The median nares are bounded entirely by the vomer and the maxilla. They correspond with the nasal face of the palato-maxillary suture, but are rather behind its palatine face, and they are about on a level with the interval between the tenth and eleventh teeth. If the anterior edge of the palatine bone bounded them, they would be a little behind the twelfth tooth. The posterior nares, $2\frac{1}{8}$ inches wide, by $\frac{7}{8}$ ths of an inch long, look altogether downwards, are completely divided by a bony septum, and have the form of a rhomboid with its narrowest side posterior. They are surrounded by a strong raised ridge, incomplete only at the anterior and outer angles of the rhomboid.

Five species of *Jacare* are enumerated by Natterer—*J. fissipes*, *J. sclerops*, *J. nigra*, *J. punctulata*, and *J. vallifrons*. They have met with only in South America.

II. In the family of the CROCODILIDÆ the teeth are usually strong and very unequal in size, and there is always a considerable difference between the anterior and the posterior teeth. The two anterior mandibular teeth are received into pits in the premaxilla; but the canines pass into grooves (which may be converted into fossæ) situated at the junction of the premaxilla and maxilla.

The other mandibular teeth are received between the maxillary teeth. The symphysis of the lower jaw does not extend beyond the level of the seventh or the eighth mandibular tooth. The premaxillo-maxillary suture may be either straight or strongly convex backwards. The divided vomers do not appear in the palate. The posterior nares look more or less backwards, and are transversely elongated. The supra-temporal fossæ are always open, and the feet are distinctly webbed. The dorsal scutes are not articulated; and there are no ventral scutes.

Two genera, *Crocodylus* and *Mecistops*, are distinguishable in this family.

Genus 4. CROCODYLUS.

The teeth are always strong and very unequal, the strongest in the upper jaw being the tenth. The mandibular symphysis does not extend beyond the level of the sixth tooth. There are usually six cervical scutes, in two rows, or forming a rhomb, and separated by a distinct interval from the tergal scutes. There are 18 or 19 teeth above, and 15 below, on each side.

1. *Crocodylus vulgaris*.

As Cuvier has remarked, it is extremely difficult to find good distinctive characters for all the species of this genus. My first difficulty was to ascertain the precise characters of that species which has been misnamed *vulgaris*, inasmuch as I could find neither in the British Museum, nor in the Museum of the Royal College of Surgeons, any *authentic* skeleton or skull of this, the so-called Nilotic Crocodile. This difficulty subsisted up to the time that the chief statements contained in the present essay were laid before the Linnean Society; but since then I have been enabled, by Dr. Gray's permission, to examine the skull of a small stuffed specimen, brought to this country from Egypt by Sir Gardner Wilkinson, and to study the splendid entire skeleton of a *Crocodylus vulgaris* in the Christchurch Museum at Oxford, presented to that Institution by the gentlemen who shot it on the Nile, and set up with great care under the auspices of my friend Dr. Rolleston, Lee's Reader in Anatomy and Curator of the Museum. Fortunately the entire skin has been preserved; so that this is the most complete record of the hard parts of any individual crocodile with which I am acquainted, besides being, so far as I am aware, the only authentic entire skeleton of *Crocodylus vulgaris* in this

country. I subjoin the chief points of interest which I noted in my brief examination of this valuable specimen :—

	Inches.
The total length of the skeleton is	114
" " " skull	16
Between the outer edges of the posterior ends of the quadrate bones	$8\frac{3}{4}$
From the snout to the middle of the canine notch...	$2\frac{3}{4}$
Transverse diameter of snout opposite 10th tooth...	$4\frac{7}{8}$
Long axis of orbit.....	$2\frac{1}{4}$
Short axis of orbit.....	$1\frac{5}{8}$
Interorbital space opposite the middle of the orbit	$1\frac{3}{4}$
Anterior edge of the orbit from end of snout	$10\frac{1}{2}$
Syncipital* area in length, about	$2\frac{1}{2}$
" " in breadth anteriorly	$3\frac{3}{4}$
" " " posteriorly	4
Supra-temporal fossæ, wide	$\frac{7}{8}$
" " long	$1\frac{1}{8}$
Least width of parietal	$\frac{7}{16}$
Total length of mandible	$20\frac{1}{2}$
Its greatest depth	3
Length of cervical region (or anterior 8 vertebræ)...	$10\frac{1}{2}$
" dorso-lumbar region	27
" sacral "	$3\frac{3}{4}$
Length of humerus	$7\frac{1}{2}$
" ulna	$5\frac{1}{4}$
" fore foot, extreme length	6
" femur	$8\frac{1}{2}$
" tibia	6
" hind foot, extreme length	$9\frac{1}{4}$

From the above measurements it will be seen that the skull is somewhat slender. Behind the canine groove it widens to the tenth tooth, which is $5\frac{3}{4}$ inches behind the end of the snout. It retains about the same diameter to the twelfth tooth, and then slowly widens again,—a sudden increase in size, to the extent of half-an-inch, taking place opposite the posterior margin of the orbit, owing to the flanging-out of the jugal. On the whole, however, there is a slow and even increase in breadth, from the

* By this term I denote that squarish flat area bounded by the postfrontal and squamosal bones laterally, by the occiput posteriorly, and by a line joining the outer angles of the postfrontals anteriorly.

canine groove to the ends of the ossa quadrata. The nasal aperture is pyriform, its wider end being forwards, and its narrow posterior extremity, into which the pointed ends of the nasal bones project, attaining the level of the first tooth behind the canine groove.

On the left side there is only a pit for the reception of the anterior mandibular tooth, while on the right side this pit is converted into a complete foramen. On the upper face of the skull, the premaxillo-maxillary suture runs vertically upwards through the canine groove, and then passes obliquely backwards to a point 5 inches behind the end of the snout. The anterior part of this suture lies in a strong ridge, which is continued downwards and forwards on the premaxilla to the level of the fifth tooth, a groove separating it from the margin of the nasal aperture. Posteriorly this ridge dies away, but a curved irregular elevation, convex inwards, arises opposite the tenth tooth. It is wholly confined to the maxilla, not extending on to the nasals.

There is a distinct, rough, irregular elevation, bounded on its outer side by a sharp groove, which extends back to the orbit, on the lachrymal bone. The profile of the skull is convex as far as the posterior boundary of the nostril, and very slightly concave from that point as far as the twelfth tooth. It then passes back as a straight, slightly ascending line, only interrupted by the lachrymal ridge, to the margin of the occiput. The inferior margin of the maxilla is convex downwards as far as the canine groove, whose lower end is indicated by a deep sinuation. It then becomes convex again, the crown of the curve being at the ninth and tenth teeth, and its posterior end sweeping into a concavity whose summit is at the twelfth tooth. Behind this the edge of the maxilla is only slightly convex. The inferior contour of the jugal bone is very concave; but the articular end of the quadrate bone descends to the level of the edge of the ninth alveolus.

The orbits have a sort of heart-shape, their apices being turned forwards, and their more convex sides inwards.

The supra-temporal fossæ are half-moon-shaped, their straight sides being external and so inclined that, if prolonged, they would decussate upon a line joining the anterior margins of the orbits.

On the palatine surface of the skull, the premaxillo-maxillary suture runs backwards from the canine groove, as far as the level of the middle of the second alveolus behind the groove (or that of the seventh tooth), which point it reaches at about the junction of the middle with the inner third of the palatine plate of the

maxilla. The suture then turns abruptly forwards until it reaches the level of the anterior margin of the alveolus of the sixth tooth, when it bends suddenly inwards to meet its fellow. The whole suture, therefore, has the form of a W. The vomers are completely hidden.

The posterior nares look downwards and backwards; their aperture is, from the incompleteness of the septum, single, and has a transversely elongated crescentic form. It measures $1\frac{1}{8}$ inch in width by $\frac{3}{8}$ ths antero-posteriorly. The basi-sphenoid is seen for about $\frac{1}{8}$ th of an inch on the base of the skull behind it, bounding the sides of the eustachian tube. The dental formula is $\frac{18-18}{15-15}$. The fourth and tenth teeth are largest in the upper jaw, the first and fourth in the lower. The eight posterior teeth on each side in the upper jaw, and the five posterior in the lower, have a marked constriction between the short crown and the fang of the tooth. There are deep interdental pits for the reception of the mandibular teeth between the third and fourth, and fourth and fifth teeth above, and between the succeeding teeth from the sixth to the thirteenth.

The hyoidean cornua are very strong curved bones, the chord of whose arc measures $3\frac{1}{2}$ inches. They are concave inwards, convex outwards, concave posteriorly, convex anteriorly; they are flattened from side to side below, but they end above in subcylindrical styloid extremities.

In the ninth vertebra the neurocentral suture passes just above the base of the parapophysis; it traverses the parapophysis in the tenth and eleventh vertebræ, while in the twelfth the parapophysis suddenly rises to the root of the diapophysis, and the suture lies far below it. The centra of the dorsal vertebræ, as far as the thirteenth inclusive, have hypapophyses. The diapophyses of the ninth vertebra pass almost horizontally outwards, but are a good deal inclined backwards. In the succeeding vertebræ up to the fourteenth or fifteenth, the diapophyses are, in addition, inclined upwards, the upward inclination being most marked in the tenth, eleventh and twelfth vertebræ. From the fifteenth vertebra onwards, the transverse processes pass almost directly outwards, without either upward or backward inclination. The span of the transverse processes is greatest in the eighteenth and nineteenth vertebræ, in which the distance between the extremities of these processes is $7\frac{1}{4}$ inches, a length about equal to that of the longest vertebral rib.

The rib of the ninth vertebra is terminated by a single long and slender semicartilaginous process which does not unite with the

sternum. Each of the vertebral ribs from the tenth to the seventeenth vertebræ inclusively, on the other hand, is united with the sternum, or its continuation, by two such semicartilaginous costal elements, which may be respectively termed sternal and lateral. The sternal elements of the ribs of the tenth and eleventh vertebræ are united with the sternum proper; those of the next five vertebræ are connected with its median backward prolongation, while those of the seventeenth vertebra are attached to the processes into which this prolongation divides posteriorly.

The sternal costal elements are very broad and flat, and though the lateral ones are less so, they are wide and expanded. The lateral costal pieces of the eleventh to the sixteenth vertebræ inclusively, give attachment to very large and flat, triangular, *processus uncinati*. Those of the twelfth are $3\frac{3}{4}$ inches long and $1\frac{3}{4}$ inch wide at their widest part. The transverse processes of the twentieth vertebra bear rudimentary ribs. The centrum of the thirteenth vertebra is $1\frac{3}{4}$ inch long, and the vertebra is $3\frac{3}{4}$ inches high from the lower edge of the centrum to the summit of the neural spine. The centra of the vertebræ retain nearly the same length to the twentieth caudal; but behind this vertebra they are shorter, as are the anterior dorsal vertebræ. The first caudal vertebra is provided with two styliform bones, which represent the chevron bones of the other caudal vertebræ, but are not united below.

The dorsal scutes have the arrangement which has often been described. They are separated (except perhaps the median rows) by integumentary spaces, neither overlapping nor uniting by sutures; and there are no ventral scutes.

Among the osteological characters which have been detailed, the peculiarities of the tergal armour, the proportions of the skull, combined with the characters of the ridges upon its surface, and the form of the premaxillo-maxillary suture amply suffice to diagnose this species. Even in the small skull, only $5\frac{1}{2}$ inches long, lent to me by Dr. Gray, the characteristic features of the species are well exhibited, although age appears to give rise to many differences. Thus the posterior margin of the external nostrils does not extend so far back as in the adult, and the facial is smaller in proportion to the syncipital region, whose anterior and posterior transverse dimensions are very nearly equal. The orbits are proportionally larger, the interorbital space more excavated; and the outer straight margins of the supratemporal fossæ are parallel with the longitudinal axis of the skull. Still more important differences

are visible on the palatine face of the skull. The premaxillo-maxillary suture reaches back, indeed, to the line of the seventh tooth; but it forms an even curve whose summit is in the middle line. The aperture of the posterior nares, again, has a totally different form from that which it assumes in the adult. It is somewhat heart-shaped, with its apex forwards, measures $\frac{1}{4}$ inch long by $\frac{3}{16}$ ths at broadest, and looks altogether downwards, while its anterior margin is situated far more forward in the palate than that of the adult.

2. *Crocodilus biporcatus*.

This, the best-known Crocodile, is a very well-marked species, characterized (beside the peculiarities of its dermal armour) by a comparatively slender skull, similar in shape to that of *C. vulgaris*, and, like it, without any sudden enlargement immediately behind the canine groove; and by the strong ridge which arises on each lachrymal bone close to the anterior edge of the orbit, and is continued forwards on to the line of junction of the nasal and maxillary bones, so that the naso-maxillary suture traverses the axis of the ridge, and then curves outwards, descending towards the alveolus of the tenth tooth. The premaxillo-maxillary suture is W-shaped; and its salient angles reach backwards even to the level of the posterior margin of the seventh alveolus.

3. *Crocodilus Americanus (acutus, Cuv.)*

has the slenderness of snout (even more marked) and the form of the premaxillo-maxillary suture of the preceding species; but it is at once distinguished from this and all other Crocodiles (except *C. rhombifer*) by the marked longitudinal and transverse convexity of the middle of the face, which gives the profile a totally different aspect from that of the other species, which are flat or concave in this region.

4. *Crocodilus Journei*

is another unmistakeably distinct and very remarkable species. The descriptions and figures given by Graves, Bory de St. Vincent, and Duméril and Bibron, of the unique specimen of this Crocodile in the Bordeaux Museum, would alone have compelled me to differ entirely from the view taken by Dr. Gray of the affinities of this species. These observers agree in stating that *Crocodilus Journei* has six cervical scutes, arranged as in the other Crocodiles, and, as Graves says, "separated by an interval of four inches" from the commencement of the tergal scutes, whence it is obviously impos-

sible that it can be a *Mecistops*. But, in addition to this, I had the good fortune to find, among the recent additions to that excellent osteological collection which Dr. Gray has gradually formed at the British Museum, the skull of a Crocodile obtained from a dealer in Paris, and labelled by him "Croc. de l'Orinoko." I at first imagined this Crocodile to be a *Mecistops*; but on careful investigation it turned out to be no other than the skull of a *Crocodylus Journei*, somewhat larger than the Bordeaux specimen, but, as the subjoined measurements will prove, agreeing with it in all its proportions:—

	Inches.
Length from end of snout to end of ossa quadrata...	22 $\frac{1}{2}$
Breadth between outer margins of ossa quadrata ...	9 $\frac{3}{4}$
—— at the level of the anterior margins of the orbits	5 $\frac{1}{2}$
—— at the tenth tooth	3 $\frac{1}{2}$
—— at the end of the snout	2 $\frac{3}{4}$
—— of the interorbital space	1 $\frac{3}{4}$
Length of mandibular symphysis	5

Now Duméril and Bibron expressly state that the length of the head of *C. Journei* equals 2 $\frac{1}{2}$ times its greatest transverse diameter, that the width of the jaws at the anterior margins of the orbit equals one-fourth the length of the head, and that at the tenth tooth it equals one-sixth the length of the head; and these are as nearly as possible, it will be observed, the relations of the same dimensions in the above list.

In the specimen in the British Museum there are eighteen teeth on each side above, and fifteen below. The Bordeaux specimen is stated to have the same dental formula, except that there are sixteen teeth in the left ramus of the mandible. The fourth and tenth maxillary teeth are stated by Graves to be as large again as the others; and the corresponding alveoli have these proportions to one another in the British Museum specimen. In fact, there can be no doubt that this skull is that of a true *Crocodylus Journei*.

But its general characters at once prove the close affinity of *C. Journei* with the other true Crocodiles, from which it differs only in its elongated and gradually tapering skull, and in the more backward extension of the mandibular symphysis*, which attains the level of the posterior margin of the sixth tooth.

In this character, and in the extreme slenderness of the snout,

* The greater proportional length of the symphysis is noted by Duméril and Bibron.

there is doubtless an approximation to *Mecistops*; but *Crocodylus Journei* is sharply separated from that genus by the characters of its teeth, and by those of its dermal armour.

5. *Crocodylus bombifrons* (*palustris*?).

All the species of *Crocodylus* which I have hitherto mentioned have, in common, the backward curvature of the premaxillo-maxillary suture to the level of the seventh tooth. But there is a species of Crocodile, about whose proper specific name I am by no means clear, in which this suture passes straight across the palate, or may even be a little convex forwards.

And not only do the skulls of this species exhibit this approximation to those of the *Alligatoridæ*, but they resemble them still further in their rounded snouts, their great width immediately behind the canine groove, and in the fact that, in young specimens, one or the other canine may be received into a pit instead of into a groove*.

In the Hunterian Collection there are seven skulls, varying in length from $5\frac{1}{4}$ inches up to 16 inches, in none of which does the crown of the premaxillo-maxillary suture extend beyond a line joining the sixth pair of teeth. In all there are two short ridges (convergent in young specimens, nearly parallel in old ones) upon the lachrymal bones, which end before reaching the anterior limits of those bones. They all have an oblique ridge on the upper jaw above the tenth tooth; and the snout attains the width which it has opposite this tooth immediately behind the canine groove. In the British Museum there are five middle-sized skulls with the same characters; but two of these have a pit on one side of the upper jaw, and a groove on the other, and one has something between a pit and a groove on each side.

Dr. Gray, has in his 'Catalogue†,' mentioned the peculiar transverse disposition of the premaxillo-maxillary suture in his *Croco-*

* In a skull of this species $14\frac{1}{2}$ inches long, in the British Museum, the vomers are completely excluded from the palate, and their anterior ends do not extend for an eighth of an inch beyond the palatine part of the palato-maxillary suture, which lies on a level with the anterior margin of the twelfth alveolus. Each vomer is $2\frac{3}{8}$ inches long, and presents the same general form as that of *Jacare*; only the anterior division is but a very small, flat and thin plate, not a quarter of an inch long. The boundary of the median nares is formed in equal proportions by the vomer and the palatine, and is opposite the fourteenth tooth. The hinder end of the vomer articulates with the end of the descending process of the prefrontal.

† 'Catalogue of the Tortoises, Crocodiles, and Amphisbænians in the Collection of the British Museum,' 1844, p. 59.

dilus bombifrons; and on examining the two crania thus named in the British Museum collection, one of which is 20 and the other 21 inches long, I can discover no distinguishing character between them and those already described. There can be no doubt then, I think, that these constant and well-marked characters, exhibited by fourteen skulls which vary in length from $5\frac{1}{4}$ to 21 inches, prove the existence of a distinct species of Crocodile, which I would provisionally term *bombifrons*.

I believe that this species has been constantly confounded with *biporcatus*, from which it may be at once distinguished by the direction of the premaxillo-maxillary suture, and by the shape of the snout behind the canine groove. I have found these distinctions to hold good at all ages; but the last-mentioned difference is far more marked in middle-aged than in either young or old specimens.

All the skulls named *Crocodilus palustris* which I have seen are referable either to *C. biporcatus* or to *C. bombifrons*. With respect to the *C. palustris* of Lesson and Duméril and Bibron, the latter authors consider it to be only a variety of *C. vulgaris*. Their description would, however, apply very well to *C. bombifrons*, as I have defined it above; and they expressly state ('Erp. Générale,' t. iii. p. 113) that all their specimens (twelve in number and varying in length from 30 centimetres to more than 3 metres) came from the East Indies or the Seychelle Islands. Now, Duméril and Bibron enumerate only three Asiatic Crocodiles—*C. biporcatus*, *C. palustris*, and *C. galeatus*, the last of which was only known to them by description; so that all the numerous Asiatic crocodiles which passed through their hands belonged either to *C. biporcatus* or *C. palustris*. On the other hand, all the skulls of crocodiles from Asia which I have met with (amounting to at least twenty) are either those of *C. biporcatus* or of the species which I have called *bombifrons*; so that I suspect the latter title will turn out to be a synonym of *palustris*.

6. *Crocodilus rhombifer*.

I have not been able to obtain any skull of this species, which, according to Cuvier's account and figures ('Oss. Fossiles,' t. ix. p. 102), resembles *C. Americanus* in the great convexity of its nasal region, but differs from it in the greater breadth of the skull, and in the strong converging preorbital ridges, which appear to be limited to the lachrymal bones. If the figures are to be trusted, however, there are other very important distinctive characters

about the cranium of this species; for Cuvier's, fig. 2, pl. 331, which gives a view of the palate, shows the premaxillo-maxillary suture forming a nearly straight transverse line.

There remain several species of *Crocodilus* whose skulls I have not been able to examine, and of which no sufficient descriptions exist. Of these, (7.) *C. galeatus* and (8.) *C. Gravesii* (*planirostris*) would appear to be very distinct forms. (9.) *C. marginatus* is considered by Duméril and Bibron to be only a variety of *C. vulgaris*; and they take the same view of (10.) *Crocodilus suchus*. Professor Owen, however, has figured the cranium of an Egyptian mummy under this name ('Monograph on the Reptilia of the London Clay,' Pal. Soc., 1850). In the under-view of this skull (tab. i. fig. 2), the junction of the premaxilla and the maxilla in the palate seems to be broken away; but on the left side, the palatine process of the maxilla is entire, as far as the level of the anterior margin of the sixth tooth, and there is not a trace of a suture behind this point. Are there, then, two or more species of Crocodile in Egypt, as Geoffroy St.-Hilaire supposed?

With regard to the distribution of the species of *Crocodilus*, *C. vulgaris*, *C. marginatus*, and *C. suchus* (?) appear to be exclusively African; all the crocodiles from other parts of the Eastern hemisphere, which I have met with, belong, as I have stated above, either to *C. biporcatus* or *C. bombifrons*, both of which species are found in the Ganges. *Crocodilus galeatus* appears to be peculiar to Siam. *Crocodilus Americanus* and *C. rhombifer* are undoubtedly American. *C. Journei* has been supposed to be African; but such positive evidence as exists tends rather to prove it to be an American species. Thus Bory de St. Vincent states that the Bordeaux specimen is "suspected to have come from America;" and, as I have said, the skull in the British Museum is labelled "from the Orinoko."

Crocodilus Gravesii (*planirostris*) is supposed by Bory de St. Vincent to have been brought from the Congo; but its real origin is not known.

Genus 5. MECISTOPS.

The cranium is elongated, and the snout slender and Gavial-like. There are eighteen slender and subequal teeth above, and fifteen below, on each side. The mandibular 'symphysis extends back to the level of the seventh tooth. The cervical scutes are arranged in two transverse rows, each of which contains two scutes; and there is no space left between the posterior row and the tergal series.

This excellent genus, as established by Dr. Gray, includes Cuvier's *Crocodilus cataphractus* (which Dr. Gray considers to be the young of a species whose full-grown form was discovered by Mr. Bennett in West Africa), *Crocodilus Journei* and *Crocodilus Schlegelii*. As I have endeavoured to show, however, *C. Journei* is a true crocodile; and, as I shall point out below, Müller and Schlegel have satisfactorily proved *C. Schlegelii* to be a Gavial. Consequently *Mecistops* is at present represented by only one species, which must be called *M. cataphractus* if *M. Bennettii* of Gray is really the adult of the form which Cuvier described.

III. In the family of the GAVIALIDÆ, the snout is always very long and slender; the teeth are for the most part slender, sharp-edged, and subequal. The two anterior mandibular teeth pass into grooves, one of which lies on each side of a beak-like prominence of the premaxillæ, which carries the two anterior upper teeth. The canines are received into grooves. The mandibular symphysis extends back to at least the fourteenth tooth, and is partly formed by the junction of the splenial bones. The premaxillo-maxillary suture is always strongly convex backwards. The posterior nares are situated more forward than in the *Crocodili*. The temporal fossæ are large. The feet are strongly webbed. The dorsal scutes are not articulated; and there are no ventral scutes.

I distinguish two genera in this family, *Rhynchosuchus* and *Gavialis*.

Genus 6. RHYNCHOSUCHUS.

There are twenty teeth above, and eighteen or nineteen below, on each side; the mandibular symphysis extends to the fifteenth tooth. The posterior teeth of the upper jaw, and almost all those of the lower jaw, are received into interdental pits; the orbital margins are not raised; and the premaxillæ are hardly at all expanded. The premaxillo-maxillary suture does not reach the third tooth behind the notch.

I propose the name *Rhynchosuchus* to indicate that generic type which is at present represented by the solitary species called by Müller and Schlegel *Crocodilus (Gavialis) Schlegelii*, and admirably described and figured by them in their essay, 'Over de Krokodilen van der Indischen Archipel,' in the 'Verhandelingen over de natuurlijke Gesch. der Nederl. overzee. Bezittingen,' 1839-1844. Under the title *Crocodilus (Gavialis) Schlegelii* (p. 18), they say—"The Gavial from Borneo, when compared with

the Indian one, is principally distinguished by the following characters:—

“ 1. By its stronger form and better developed limbs.

“ 2. By its much less slender head and snout, which last does not narrow so suddenly in front of the eyes as in *G. Gangeticus*.

“ 3. By the smaller number of teeth, of which there are twenty above and eighteen below on each side, while *G. Gangeticus* has $\frac{28}{26}$ or $\frac{27}{25}$; furthermore, the teeth are stouter, less curved, and less sharp, and are disposed more perpendicularly, and the ninth tooth of the upper jaw (reckoning from the front) is considerably larger and stronger than the others; whence it follows that, just as in the true Crocodiles, the snout at the level of this tooth exhibits a lateral projection.

“ 4. By the shorter symphysis of the under jaw.

“ 5. By the absence of the swollen nasal prominence (neusklep), which characterizes the Gangetic Gavial.

“ 6. By the less expanded form of the tabular upper surface of the hinder part of the skull.

“ 7. By the very slight production of the edges of the orbit.

“ 8. By the large eyes.

“ 9. By the presence of a number of small nuchal shields, while *G. Gangeticus* has but one pair.

“ 10. By the strongly developed keels of the dorsal scutes.

“ 11. By the much larger scales on the under parts and on the legs of the animal.

“ 12. By the different colours with which it is variegated.”

These authors further point out that the vomers appear for a small space in the posterior part of the palate, that the opercular or splenial bones join in the symphysis of the lower jaw, and that the cervical and dorsal scutes form one continuous shield; and they represent the two anterior mandibular teeth passing in grooves on either side of the end of the premaxilla. In fact, they fully and completely establish the fact that their new species belongs to the *Longirostres* of Cuvier, or to the Gavials of later writers.

Under these circumstances, it is somewhat surprising to find the deliberate conclusions of these careful investigators set aside in the following brief passage:—

“ This Bornean species (*C. Schlegelii*) was, in fact, originally described as a new species of Gavial; but the nasal bones, as in the fossil from Sheppey, figured in t. ii. 15, extend to the hinder

border of the external nostril.”—Owen, *Fossil Reptilia of the London Clay, Crocodilia*, p. 15: 1850.

Müller and Schlegel give remarkably clear and beautiful figures of the skull of their Gavial; and these show at once that the nasal bones do not “reach the hinder border of the external nostril,” but meet the premaxillaries at a point very distant from that border, viz. opposite the ninth tooth. Even did the nasal bones reach the posterior boundary of the nostril, such a character would not outweigh those derived from the relations and number of the teeth, the structure and extent of the mandibular symphysis, and the disposition of the dermal scutes,—all of which are so clearly and definitely set forth by Müller and Schlegel, that it seems difficult to understand how any one who had consulted the original memoir could have overlooked them.

It was possible, however, that Müller and Schlegel, notwithstanding their great opportunities, might have erred in their statements; and I therefore gladly seized the opportunity of testing their description by comparing it with an authentic skull of the species in question, from New Guinea, in the collection of the British Museum.

I have found the statement of Müller and Schlegel minutely accurate in almost all points; and there cannot be the slightest doubt, not only that the Schlegelian crocodile is one of the *Gavialidæ*, but that it forms a distinct generic type in that family, as different from *Gavialis* as *Caiman* is from *Jacare*, or *Mecistops* from *Crocodylus*.

The following are the most important measurements of the skull of *Rhynchosuchus Schlegelii* in the British Museum collection:—

	Inches.
Length from the end of the premaxilla to that of os quadratum.....	23
Breadth from outer edge of one os quadratum to that of the other	8 $\frac{3}{4}$
Breadth across the face in front of the orbits	4
„ at the 9th tooth	2
„ at the 5th tooth	1 $\frac{1}{2}$
„ at the 3rd tooth	1 $\frac{3}{4}$
„ of the beak-like curved process which carries the two anterior teeth	1
Mean width of lower jaw from symphysis to extremity	1 $\frac{5}{8}$

	Inches.
Length	12
No tooth measures transversely more than	$\frac{5}{16}$

The face is very smooth; but a slight longitudinal groove runs down on each side from the anterior margin of the orbit for about two inches. Anteriorly to this point the snout retains a nearly even diameter as far as the ninth tooth, in front of which it suddenly narrows a little, retaining nearly the same dimensions to the fourth tooth, where it widens a very little, and then suddenly narrows to the terminal beak. The lower jaw does not expand at all at its extremity. The nasals join the premaxillaries opposite the ninth tooth, and the splenial bones, in the lower jaw, end opposite the tenth mandibular tooth, as the figures of Müller and Schlegel show. The vomers appear between the inner edges of the palatines posteriorly, as a thin bony band $1\frac{3}{8}$ inch long by $\frac{1}{8}$ inch wide, which tapers at each end and is divided by a longitudinal suture. The ninth tooth of the upper jaw is stronger than the rest.

The only point in which the description of Müller and Schlegel seems to me to be incomplete* is with regard to the disposition of the teeth. They say—"The teeth of *C. Schlegelii*, as regards their form and development, more nearly resemble those of the true Crocodiles; but in the way in which the teeth of the two jaws are opposed, there is the most complete resemblance between our species and the Gangetic Gavial,—both which species differ from all other crocodiles in the circumstance that when the mouth is shut, all the teeth of the under jaw project outside the lateral margin of the upper jaw" (*l. c.* p. 22).

What I find is this:—The anterior teeth of both the upper jaw and the mandible are long, slender, sharp-edged, and slightly curved. The posterior eleven, on each side, in the upper jaw, are short, straight, conical, and constricted below their crowns. There are deep interdental pits between the ten posterior mandibular teeth, into which the opposed teeth of the maxilla are received when the jaws are closed. All the mandibular teeth, except the two anterior and the fourth pair, pass into like pits in the upper jaw. The anterior eight teeth on each side of the upper jaw pass straight down outside the lower jaw. In the Gangetic Gavial the relations of the teeth of the two jaws appear to me, as I shall state below, to be very different.

* Or it is possible that the *Rhynchosuchus* from New Guinea, which I have examined, is specifically distinct from the Bornean form.

Rhynchosuchus Schlegelii inhabits the inland lakes of Borneo, and is found in New Guinea.

Genus 7. GAVIALIS.

There are twenty-seven or twenty-eight teeth in the upper, and twenty-five or twenty-six in the lower jaw. The mandibular symphysis extends to the twenty-third or twenty-fourth tooth. The lateral teeth of both jaws are, all but the very hindmost, directed obliquely downwards (or upwards), forwards or outwards, and are not received into interdental pits. The anterior margins of the orbits are raised. The premaxillæ and the end of the mandible are greatly expanded. The premaxillo-maxillary suture reaches the level of the fourth tooth behind the canine notch.

The only true *Gavialis* is the well-known *G. Gangeticus* from the East Indies. In this 'Gavial,' or 'Garrhial,' the vomers are slender bones which do not extend further forwards than the level of the twenty-second or twenty-first tooth, and have but a very short and slender representative of the anterior flattened division of the bone in *Jacare*; posteriorly they extend back to the level of the descending processes of the prefrontals. In a skull 25 inches long the vomers have a length of about 4 inches, extending as they do a little further forward than the palato-maxillary suture. The median nares are opposite the twenty-fifth tooth.

All the *Crocodylia* which I have enumerated are provided with two perfectly distinct kinds of dermal armour,—the one consisting of plates of horn, produced by a modification of the superficial layer of the epidermis; the other composed of discs of bone marked by a peculiar pitted sculpture on their outer surfaces, and developed within the substance of the dermis. To the former I shall apply the term "scales;" the latter are what I have denominated "scutes."

All recent *Crocodylia* have both scales and scutes in the dorsal region of the body, the scutes underlying, and having the same general form as, the scales. In all, the ventral region of the body is also covered with scales which have a very definite shape; but in no recent Crocodylian which I have examined, save those species which are included in the genera *Caiman* and *Jacare*, are there any scutes in the ventral region.

Again, in the genera *Alligator*, *Crocodylus*, *Mecistops*, *Rhynchosuchus*, and *Gavialis*, the edges of the scutes, except those of the two median longitudinal rows, are hardly ever united by sutures,

nor do the posterior margins of those in each transverse row overlap the anterior margins of the succeeding row. At any rate, there is no flat, bevelled, articular facet on the outer surface of the anterior margin of a scute, for articulation with the inner surface of the posterior margin of its predecessor. In the genera *Caiman* and *Jacare*, however, the lateral edges of all the scutes of the dorsal and ventral shields are united by serrated sutures; and the anterior end of the outer face of each is provided with a well-marked smooth facet, which is overlapped by the smooth under-surface of the scute in front of it.

I first noticed the remarkable structure of the dermal armour of these *Alligatoridæ* in the skin of a *Jacare* (*sp. incerta*), wanting the end of the tail, but which must have belonged to an animal between five and six feet in length. It had long been in my possession; but I had never before had occasion to study its characters minutely.

The horny scales, which had the appearance of thin tortoise-shell, could be readily peeled off (especially by the aid of a little caustic potash); and then the white surface of the subjacent bony scute upon which they were modelled came into view. It is to be understood, however, that the inner surface of the scale corresponded only in its general form with the outer surface of the scute; for it did not dip into the pits with which the latter is sculptured. These are in fact filled by the dry dermis which extends over and encloses the scute, a very thin layer (bearing the rete mucosum) being interposed between it and the scale; so that the pitted sculpture does not come out well until the scutes have been boiled.

The *dorsal* scutes are both carinated and angulated. By the application of the former term, I mean to indicate that, along a median or submedian longitudinal line, their substance is more or less elevated, so as, in many cases, to form a very prominent crest. This crest always subsides before it reaches the anterior margin of the scute, though it may extend beyond the posterior margin. Its highest point is always behind the centre of the scute, and is devoid of sculpture. The sculpture however seems to radiate from this point, inasmuch as it consists, on the greater part of the scute, of distinct pits, which are usually round towards the centre, but towards the periphery become ovals with their long axes directed towards the point in question.

The smooth inner surfaces of the scute shelve towards a depression which corresponds with the external ridge, under which the

sides of the scute seem to meet in an angle. This may be called the 'angulation' of the scute. From before backwards, the inner surface of the scute is a little convex. The scute is thickest in the middle; posteriorly, it thins off to an edge and overlaps its successor; anteriorly, its outer surface is bevelled off at an acute angle with the inner, so as to give rise to a smooth shelving surface—wide from side to side, narrow from before backwards—forming the 'articular facet,' which is overlapped by the inner surface of the posterior edge of the preceding scute. I have termed this the 'articular facet;' but it must not be supposed that there is anything like a true joint between the opposed facets of the overlapping and overlapped scutes; on the contrary, they are at once separated and connected by the dermal connective tissue.

The posterior margin of the articular facet is separated by a deep transverse groove, divided by little partitions into as many pits, from the rest of the sculptured surface; but there is no trace of any suture dividing the scute into two portions. The lateral margins of each scute are united by serrated sutural edges with those which lie next to them in the same transverse row; so that each row forms a nearly solid flat bony bar, composed, in the middle of the back, of as many as ten distinct scutes. The outer edges of the outermost scutes only, thin off and exhibit no sutural serration, inasmuch as they are not directly connected with any other scutes.

The median line of the back corresponds in general with the suture between the two middle scutes of each transverse row; so that the scutes are disposed symmetrically on either side of that line. Furthermore, the anterior part of the inner surface of each of the two middle scutes is connected by ligament with the extremity of the spinous process of a vertebra; at least, this is the case in the dorsal, lumbar, sacral, and anterior caudal regions.

The scutes which protect the *ventral* side of the body, from the throat backwards, are four-sided and similar in their ornamentation to the dorsal scutes; but they exhibit neither ridge nor angulation, their outer and inner surfaces being parallel, and either nearly flat or evenly curved. Each forms, in fact, a segment of a large cylinder, inasmuch as the whole ventral shield is convex transversely, being nearly flat in the middle and much bent up at the sides. The dorsal shield, taken as a whole, is, on the contrary, nearly flat. The lateral edges of the ventral scutes interlock suturally; and their anterior and posterior edges are overlapped and overlap, just like the dorsal scutes. The outer edges of the

outermost ventral scutes thin off and are not united with any bony element; and the ventral, like the dorsal scutes, are usually arranged symmetrically on either side of the median sutural line. There may be as many as twenty-two scutes united by their lateral sutures into a single strong, curved, transverse, bony, bar-like segment of the ventral armour.

Throughout the neck and body, and as far as the commencement of the tail, the ends of the dorsal and ventral bony bars, whose sum may be regarded as a dorsal and a ventral shield respectively, are separated by an interval of integument, in which only small scattered scutes are visible. The physiological import of this arrangement becomes obvious when we consider in what manner the animal breathes; and indeed the integumentary interval answers very precisely to the leather which connects the two boards of a bellows. Again, though the limbs are themselves covered with articulated scutes, they are afforded free play upon the body by this flexible interspace. Immediately behind the hind legs, the ventral and dorsal shields unite; and the tail is from that point surrounded by a succession of bony hoops, each of which corresponds with a vertebra, the segments of the exoskeleton answering to those of the endoskeleton.

The most remarkable feature about the ventral scutes, however, and that in which they differ most widely from the dorsal ones, consists in the fact that each scute is composed of two distinct pieces, an anterior and a posterior, which unite together by a transverse serrated suture. The anterior piece or 'semi-scute' may attain to three-quarters the length of the posterior, and it has exactly the same width. The anterior semi-scute bears the articular facet and the transverse pitted groove, whose posterior wall is just in front of its hinder edge, or in other words, of the suture, when the two semi-scutes are united.

Such are the general characters and mode of arrangement of the dorsal and ventral armour of *Jacare*. But there remain many noteworthy peculiarities in the disposition and number of the components of each band of the armour.

Thus, in the *dorsal shield* there are two rows of nuchal scutes, each containing eight separate keeled bony plates; and of cervical scutes there are five rows, the two anterior of which contain four angulated and carinated scutes each, while the three posterior contain only two scutes each. All these scutes, except the anterior row, have articular facets; and all those of each row are united suturally. Of dorsal scutes there are thirty transverse rows up to

the median keel of the tail, which commences with the thirty-first row. The number of scutes in each row is as follows:—

Rows.	Scutes.	Rows.	Scutes.
1, 2, 3, 4	6	25, 26.....	5
5, 6, 7, 8, 9, 10, 11	10	27, 28.....	4
12, 13	8	29, 30	4
14, 15	6		
16, 17, 18	4	31, 32, 33, 34	5
19	6	The rest of the tail is	
20	8	wanting.	
23, 24	6		

Throughout the dorso-lumbar and sacral regions (*i. e.* up to the nineteenth row), the median scutes are hardly keeled at all, while the outer ones are the more strongly carinate the more external they lie.

In the caudal region, the second scute from the middle line, in the twenty-third row, has a strong keel and angulation, which grows stronger in the corresponding scutes up to the thirtieth inclusive, until the superior and lateral faces of these scutes, in the twenty-ninth and thirtieth rows, are inclined to one another at a right angle and very strongly keeled. I have said that, as a rule, the median line is occupied by a suture between two median scutes; but in the caudal region*, in the twenty-fifth row (which corresponds with the sixth caudal vertebra) the two median scutes are replaced by one flat scute, so that there is no suture in the middle line. In the twenty-sixth row there is a similar arrangement, but the flat scute is smaller; and in the twenty-seventh no trace of it is left, so that the strongly keeled lateral scutes meet in the middle line, which is again occupied by a suture. This continues up to the thirty-first row, when the median scute reappears as a thin vertical plate, broader below and in front, where it articulates with the median lateral scutes, than above and behind, where it exhibits a free edge only covered by the horny epidermis. It is thus that the serrated dorsal crest of the tail is formed. The scutes of the crest exhibit only very small round and distant pits.

The ventral shield begins in the neck just behind the level of

* The second and third cervical rows in *Caiman palpebrosus* and *trigonatus* also contain a median scute, and consequently an odd number of scutes. In *Caiman trigonatus*, the third to the ninth supra-caudal rows have each a median single scute.

the anterior margins of the orbits: the fifteen anterior rows may be termed subcervical, as they lie in front of the thorax. In the first six rows the scutes are very small, and increase in number up to twelve in a row. In the next six rows there are ten scutes in a row, and in the last three, twelve. All these rows are symmetrically divided by the median line. In the three hinder rows the inner scutes are longer than the outer ones; and this is most markedly the case in the fifteenth row, whose innermost scute is half as long again as the corresponding one of the preceding row, and more than three times as long as the outermost of its own row.

The sixteenth row differs from its predecessors and successors, and may be termed the axillary row. It is bent upon itself with an angle open forwards, and is divided into two halves (each of which contains seven scutes) by the union of the middle scutes of the fifteenth subcervical with those of the first row of what may be termed the subdorsal scutes, or those which lie under the thorax and abdomen. Of subdorsal and subcaudal scutes there are, up to the broken-off end of the tail, thirty-seven rows, with the following numbers of scutes:—

Rows.	Scutes.	Rows.	Scutes.
1	12	22	18
2	10	23	22
3, 4, 5	12	24	22
6, 7, 8, 9	14	25	20
10	16	26—28	18
11	14	29—31	16
12—17	14	32—34	14
18—20	12	35	12
21	14	36, 37	10

It will be noticed that there are three more rows of ventral than of dorsal scutes. On endeavouring to ascertain how this came about, I observed that the first subdorsal was a good deal behind the first dorsal row, though the eighth to the twelfth dorsal corresponded exactly with the eighth to the twelfth ventral rows. In the anterior part of the body, therefore, there is a clear general correspondence between the segments of the dorsal and those of the ventral armour.

In the caudal region, again, I found that the twenty-fourth ventral row, which is the first of the caudal rows not excavated by the

vent, corresponded exactly with the twenty-first dorsal row. It was clear, therefore, that three ventral rows were interpolated somewhere between the twelfth and twenty-first dorsal rows; and on close examination I found this interpolation to arise from the doubling of the fourteenth, fifteenth, and sixteenth ventral rows.

I have examined *Jacare fissipes* and *nigra*, *Caiman trigonatus*, and *C. gibbiceps*, in the British Museum; and I find, in all, dorsal and ventral armour having the same essential arrangement as that just described. A specimen of *Caiman palpebrosus* about two feet long, the opportunity of examining which I owe to Dr. Grant, exhibits the dorsal and ventral shields (whose scutes are in the main similarly arranged) very beautifully; and a young *Jacare* of about 18 inches in length, for which I am indebted to the kindness of the same gentleman, proves that the scutes are developed even in specimens of this age. I have no hesitation therefore in expressing my belief that this singularly complete dermal armour will be found to be characteristic of all the species of the genera *Caiman* and *Jacare*. On the other hand, I have examined *Alligator Mississipiensis*, *Crocodylus vulgaris*, *C. biporcatus*, *C. Americanus*, *C. rhombifer*, and *C. bombifrons*, *Mecistops cataphractus*, and *Gavialis Gangeticus*, of various ages and sizes, without having been able to discover a trace of ventral scutes. This is the more remarkable, as the well-marked ventral and dorsal shields of many of the ancient *Teleosauria* would lead one to expect a corresponding exoskeleton (if anywhere) in their nearest allies, the modern *Gavialidæ*. However, *Goniopholis*, with its strong armour, is more like an ordinary Crocodile; and I have recently discovered that a true Crocodile in some respects curiously similar to *C. bombifrons* (*C. Hastingsiæ*) was covered with scutes exceedingly like those of the modern *Caiman* and *Jacare*.

In minute structure the bony scutes of *Jacare* closely resemble those of such a fish as a Sturgeon: a middle layer, containing so many canals as to appear almost cancellated in longitudinal or transverse section, is covered externally by a thin, and internally by a thick, layer composed of bony lamellæ, nearly parallel to the plane of the scute. Round the canals of the middle layer, the bony lamellæ are disposed concentrically, to a greater or less extent. The lacunæ are of very various shapes; and there are perhaps as many short as elongated forms. The canals of the middle layer communicate by large branches with the inner, by smaller and fewer branches with the outer surface of the scute.

In the young *Jacare* mentioned above, I found the dermis to be

distinguishable into two layers. The more superficial of these is thin, made up of irregular or formless connective tissue, and contains many ramified pigment-masses. Its smooth outer surface underlies the rete mucosum. Internally, it passes into the second or deep layer, which consists of successive layers of distinctly fibrous connective tissue, disposed in definite parallel bundles, and having a very regular arrangement. Throughout a space corresponding with the area of each scale, in fact, the bundles of each layer cross those of the succeeding layer at right angles; and the successive tiers of bundles are tied together by short cords disposed perpendicularly to the planes of the tiers. A corresponding arrangement of the bundles of connective tissue has long been known to obtain in the dermis of Fishes and *Batrachia*. At each end of this small "mat" of connective tissue, the bundles, if I may so say, fray out; and at the anterior end, the layers, loosened in texture, bend upwards, spreading out at the same time to become continuous with the fibres of the "mat" in front. In consequence of the matting under the quadrate surface of each scale, the dermis has a peculiar faceted aspect, quite apart from any osseous deposit. Where bony scutes are formed, they appear as very thin perforated plates in the most superficial portion of the deep layer of the dermis; so that there is a single thin layer of dense connective tissue above them, while below them are all the rest of the denser and deeper lamellæ of the dermis. Through the apertures in this primitive osseous plate (the rudiment of the middle layer of the future scute), bundles of connective tissue extend, connecting the deep with the superjacent lamellæ.

If a thin section is made and decalcified with weak acid under the microscope, the calcareous matter, as it is dissolved away, leaves an obscurely fibrous matrix of a different aspect from the surrounding connective tissue, and the endoplasts, or nuclei, of this matrix are seen each to have occupied the centre of a lacuna.

Again, the rudimentary scute lies in the dermis as in a sort of pocket, the superficial and deep walls of which separate from it with great ease; and in good thin sections made through the dermis and scute, there seems to be no direct connexion between the substance of the scute above and below, and the connective tissue with which it is in contact. Nor could I satisfy myself that the margins of the scute were continuous with the surrounding bundles of connective tissue. However, the specimen had been a very long time in spirit; and I am unwilling to lay too much stress upon these observations, which tend to negative the supposition

that the scute proceeds from the direct calcification of the connective tissue of the dermis.

On the other hand, I must remark that horizontal sections of the scutes have presented oblique parallel fissures, sometimes crossing one another, which might readily be supposed to correspond with the lines of separation of ossified bundles of connective tissue.

NOTE.—During a recent visit to Paris, my friend Mr. Busk was kind enough to examine the specimens of recent *Crocodylia* in the Museum of the Jardin des Plantes, with reference to certain points to which I requested his attention. Mr. Busk informs me that there is no doubt about the transverse direction of the premaxillo-maxillary suture in *Crocodylus rhombifer*; and his statements lead me to entertain no question that *C. bombifrons* is a synonym of *C. palustris*.

In the typical specimens of *C. marginatus* and *C. suchus* of Geoffroy St.-Hilaire, the premaxillo-maxillary suture extends back to the level of the seventh tooth.

Mr. Busk has furthermore pointed out to me the existence of another American species of Crocodile—*C. Moreletti*, which has been described by M. Auguste Duméril in his “Description des Reptiles nouveaux ou imparfaitement connus,” &c., ‘Archives du Muséum,’ t. vi. 1852.

This species inhabits lake Flores, in Yucatan; and it is said by M. Duméril to approach *C. Americanus*, from which it differs in the proportions of the skull and in the characters of the dermal armour.

June 21st, 1859.

On the Habits of the “Aye-Aye” (*Cheiromys madagascariensis*, L., Cuv.). By the Hon. H. SANDWICH, M.D., C.B., Colonial Secretary of the Mauritius. Communicated by Prof. OWEN, F.R.S., V.P.L.S.

[Read April 7th, 1859.]

“Mauritius, Jan. 27, 1859.

“MY DEAR MR. OWEN,—After very great difficulty and much delay, I have at length obtained a fine healthy male adult *Aye-Aye*; and he is now enjoying himself in a large cage which I have had constructed for him.

“He is a most interesting little animal; and from close observa-

tion I have learnt his habits very correctly. On receiving him from Madagascar, I was told that he ate bananas; so of course I fed him on them, but tried him with other fruit. I found he liked dates,—which was a grand discovery, supposing he be sent alive to England. Still I thought that those strong rodent teeth, as large as those of a young Beaver, must have been intended for some other purpose than that of trying to eat his way out of a cage—the only use he seemed to make of them, besides masticating soft fruits. Moreover, he had other peculiarities, — *e.g.*, singularly large, naked ears directed forward, as if for offensive rather than defensive purposes; then, again, the second finger of the hands is unlike anything but a monster supernumerary member, it being slender and long, half the thickness of the other fingers, and resembling a piece of bent wire. Excepting the head and this finger, he closely resembles a Lemur.

“Now as he attacked, every night, the woodwork of his cage, which I was gradually lining with tin, I bethought myself of tying some sticks over the woodwork, so that he might gnaw these instead. I had previously put in some large branches for him to climb upon; but the others were straight sticks to cover over the woodwork of his cage, which *alone* he attacked. It so happened that the thick sticks I now put into his cage were bored in all directions by a large and destructive grub called here the *Moutouk*. Just at sunset the Aye-Aye crept from under his blanket, yawned, stretched, and betook himself to his tree, where his movements are lively and graceful, though by no means so quick as those of a squirrel. Presently he came to one of the worm-eaten branches, which he began to examine most attentively; and bending forward his ears, and applying his nose close to the bark, he rapidly tapped the surface with the curious second digit, as a woodpecker taps a tree, though with much less noise, from time to time inserting the end of the slender finger into the worm-holes, as a surgeon would a probe. At length he came to a part of the branch which evidently gave out an interesting sound, for he began to tear it with his strong teeth. He rapidly stripped off the bark, cut into the wood, and exposed the nest of a grub, which he daintily picked out of its bed with the slender tapping finger, and conveyed the luscious morsel to his mouth.

“I watched these proceedings with intense interest, and was much struck with the marvellous adaptation of the creature to its habits, shown by his acute hearing, which enables him aptly to distinguish the different tones emitted from the wood by his gentle

tapping; his evidently acute sense of smell, aiding him in his search; his secure footsteps on the slender branches, to which he firmly clung by his quadrumanous members; his strong rodent teeth, enabling him to tear through the wood; and lastly by the curious slender finger, unlike that of any other animal, and which he used alternately as a pleximeter, a probe, and a scoop.

"But I was yet to learn another peculiarity. I gave him water to drink in a saucer, on which he stretched out a hand, dipped a finger into it, and drew it obliquely through his open mouth; and this he repeated so rapidly, that the water seemed to flow into his mouth. After a while he lapped like a cat; but his first mode of drinking appeared to me to be his way of reaching water in the deep clefts of trees.

I am told that the *Aye-Aye* is an object of veneration at Madagascar, and that if any native touches one, he is sure to die within the year; hence the difficulty of obtaining a specimen. I overcame this scruple by a reward of £10.

"I quite despair of obtaining the bones of the *Dinornis* or *Dodo*, though I have made every effort. I shall always be proud to be of service.

"Believe me, yours very faithfully,

"H. SANDWITH."

On the Moulting of the common Lobster (*Homarus vulgaris*) and Shore Crab (*Carcinus mænas*). By S. JAMES A. SALTER, M.B., F.L.S., F.G.S.

[Read April 7th, 1859.]

I AM induced to bring this subject before the Linnean Society, on account of the singularly perfect specimen of the thrown-off slough of a Lobster which I have now an opportunity of exhibiting, and because the process by which it was shed was witnessed and carefully watched by two competent observers—by my friend Mr. Robert Cooke, of Scarborough, a Fellow of this Society, and by the intelligent wife of the Curator of the Scarborough Museum, in an aquarium in which institution the occurrence took place.

The methods by which certain of the Decapod Crustaceans cast their old shells in the process of renewal and growth have already been made the subject of observation and record.

Réaumur, as early as 1712, and again in 1718, saw and described

the sloughing of the common freshwater Crayfish (*Astacus fluviatilis*).

It was witnessed in the common edible Crab (*Cancer Pagurus*) by Mr. Couch, in 1833.

Subsequently the moulting-process was observed by Mr. Gosse, in the Spinous Spider-crab (*Maia Squinado*).

Beyond these three recorded examples, I believe that the actual operation of moulting in Decapods has never been seen, though the sloughs of our common Crustacea, and the animals themselves but recently emerged from their old shells, are familiar to all marine zoologists.

There is no recorded account of the moulting of the Lobster, that I have been able to discover.

The Lobster from which the slough was obtained, and whose operations are the subject of this communication, was an inhabitant of a large marine aquarium in the Museum at Scarborough. The period was July 1857. The aquarium contained the ordinary assemblage of sea-shore animals, and a considerable collection of vegetation, which consisted of *Ulva*, *Fucus*, and other common sea-weeds.

For two days previous to its throwing off the shell, the Lobster was observed in a very peculiar attitude, and to be very busily engaged. Its abdomen was permanently and stiffly erected and straight; while the animal, in this rigid attitude, was hard at work detaching and carrying all the soft sea-weed it could collect to one end of the aquarium, where it thus accumulated a large mass of vegetation, which was afterwards destined to become a screen and protection for its soft body. At the same time, and by the same means, a clearing was made at the other end of the tank, in which it had space for the evolutions which were subsequently necessary for the extrication of its body.

The Lobster remained in the peculiar rigid attitude I have described, during the entire two days previous to the moult. On the third day, a crack was observed along the membrane which unites the dorsal surface of the first abdominal ring with the carapace; and when these parts became separated by about half an inch, the bright-blue membrane of the new shell being plainly visible beneath, the operation of extricating the abdomen commenced. By a strong vibratory action of the whole abdomen, principally in a lateral direction, one segment was, at first, protruded through the split; and this was followed by an interval of complete repose, during which the animal remained quite mo-

tionless. Then, by another vibratory action, the second segment was extricated; then followed an interval of repose, when the third was withdrawn; and so on till, at last, the entire abdomen, after having been bent double upon itself, was turned completely out backwards, and then, elongated and compressed, remained above and parallel to the empty shell that it had occupied, and which was still attached to the under surface of the cephalo-thorax. Hitherto the only orifice of escape consisted in the transverse splitting of the first abdominal segment from the carapace, on the dorsal surface. None of the abdominal segments separated from each other.

Thus far the extrication had commenced at the front of the abdomen, and had progressed from before backwards. It was now observed that the carapace had split from behind forwards, the fissure commencing posteriorly at the transverse split between the carapace and the first abdominal segment, and reaching forwards to the apex of the rostrum, which, however, it did not absolutely divide. The two halves of the carapace then separating posteriorly, the interval between them, together with the original transverse slit, constituted a trifold opening, through which the rest of the animal escaped.

The escape of the cephalo-thoracic portion was effected from behind forwards. First the posterior ambulatory legs were loosened and withdrawn; then followed the next pair; and this process was continued from behind forwards, pair by pair—the withdrawal of each pair of legs being followed by an interval of repose. The limbs were withdrawn very readily from the old shell, slipping out of it as a leg would from a loose boot. No apparent effort accompanied these operations so far.

The extrication of the claws, however, was attended with much and violent exertion. This consisted of two powerful and sudden tugs, the soft abdomen of the Lobster pressing by its under surface upon the upper surface of the empty shell. By this means the soft chelæ were drawn through the narrow joints of the old shell, exhibiting strong, unmistakeable marks of the violence and pressure to which they had been subjected. The escape of the chelæ from their unyielding incasement was not aided by any splitting of the old shell, the large soft hands being drawn by compression through the narrow joints, as a wire is drawn through the contracting holes of a draw-plate.

The efforts for the withdrawal of the chelæ were the last, and succeeded in completely freeing the Lobster from its old case.

Not only the claws, but the parts of the mouth, the antennæ, and the eyes, were all unsheathed; and with the last tug the regenerate Lobster plunged backwards, and entirely escaped, above and behind the now empty shell—its former tenement.

The operation, from first to last, occupied about twenty minutes, and was performed entirely in view, in that part of the aquarium which the Lobster had cleared of sea-weed.

Immediately after emerging from the old shell, the Lobster, was much deformed: there was a general elongation of the whole animal; but this was most remarkably the case with the claws, which were quite drawn out of shape. During the few subsequent hours, both the body and the claws became shorter and much enlarged. This increase of size did not result from any unfolding of membrane of the shell previously plicated, as no folds were observable immediately after the emergence of the animal, but from a simple distension, apparently from the imbibition, either by swallowing or by endosmosis, of considerable quantities of water. The membrane of the new shell was perfectly soft, and of a bright blue colour. At first the Lobster was shy and quite inactive, retiring to and remaining concealed among the accumulated sea-weed; but in a few hours it emerged from its retreat, and moved freely about the aquarium. The membrane of the new shell remained soft for some days, but on the seventh it appeared to have become perfectly calcified.

These are the details of the exuviation of the Lobster whose cast-off shell is before the Society. By a happy accident, the same observers had an opportunity of witnessing the sloughing of another Lobster, in the month of November following. The process was identically the same in every particular; but it was observed that the subsequent calcification of the shell did not take place till after the lapse of about fourteen days,—a circumstance probably dependent on a lower temperature and a less active nutrition. These are, I believe, the only two instances in which the exuviation of the Lobster has been actually witnessed; but there exist specimens of sloughs which are entirely in keeping with this description. In the fish-house of the Zoological Society of London there are two specimens which were cast in the tanks there; and in each there is the same transverse splitting of the carapace from the abdomen, and the longitudinal splitting of the carapace itself, without any other opening for the escape of the animal.

One or two general observations are suggested by the foregoing

description. In the only examples of the exuviation of macrourous Decapod Crustaceans, there exists a singular diversity in the process itself. In *Astacus*, as described by Réaumur, the process commences with the escape of the cephalothorax; in *Homarus*, as I have now described it, it begins by the emergence of the abdomen. In *Astacus* the carapace is detached and thrown off bodily and unbroken, being severed from its attachments with the lateral portions of the cephalothorax, as is the case in the Brachyura; whereas in *Homarus* the lateral attachments of the carapace remain, whilst the plate itself is split up the centre. In *Astacus*, as is also the case in the Brachyura, the thrown-off slough is uniformly left resting on its dorsal surface; in *Homarus* the reverse is uniformly the case. But the most striking dissimilarity is to be found in the circumstances *stated* to attend the liberation of the chelæ. Prof. Bell, in the Introduction to his 'History of the British Stalk-eyed Crustacea,' remarks—"It is impossible to imagine that the crust of the legs, and especially of the great claws of the larger species, could be cast off, unless it were susceptible of being longitudinally split" (p. 35), and he then proceeds to give the account detailed by Réaumur of the longitudinal splitting of the shell in the neighbourhood of the joints of the claws in *Astacus*, so as to allow of the extrication of the hands. Nevertheless, however impossible it may appear for the chelæ to escape without this splitting, no such circumstance occurs in the exuviation of *Homarus vulgaris*; and when we consider that the hands of *Astacus* are small in proportion to the wrist-joints, and that in *Homarus* they are larger in proportion to those joints than in any other of the Macroura, this dissimilarity in the mode in which the claws escape is the more remarkable, and, I confess, to my own mind it suggests the suspicion that the distinguished and usually most accurate French naturalist to whom I have referred may possibly in this instance have been led to consider as a fact that which was to him a supposed necessity*.

Since the foregoing account of the moulting of the Lobster was written, I have dredged a specimen of the common shore-crab (*Carcinus mænas*), in the act of casting its shell. This little crustacean had taken refuge, no doubt for the safe and secret per-

* The suspicion above expressed has been fully confirmed by observations made by Mr. J. J. Bennett, the Secretary of the Linnean Society. Mr. Bennett informs me that, in an aquarium in his possession, an *Astacus fluviatilis* has twice cast its shell, and the process of moulting was on each occasion accomplished without any splitting of the shell at the joints of the claws.

formance of sloughing in a forest of *Zostera*, on one of the mud banks in Poole Harbour, and while scraping these weeds with a keel-drag it fortunately fell into my net. It shows how the Brachyura leave their old shells by the horizontal splitting away of the carapace from the other portions of the shell—the carapace itself remaining entire; and it also shows (and this was my principal object in exhibiting the specimen) the enormous amount of increase of size upon emerging from the shell, and the rapidity with which that increase takes place. The animal, as now seen, is in exactly the same state as when taken out of the water, and its bulk is probably some four times larger than the area of the shell in which it had been encased only a few minutes before. I retained the Crab in connexion with its old shell, and prevented its further escape by wrapping it in paper, so that it could not move its limbs. I thought such a specimen would be telling and illustrative, and that the old shell, being in contact with the new, would afford facilities for contrast. In this condition the Crab died, and, being out of water some time, it became dry, and the soft new shell collapsed and bulged in; but, upon placing the dead Crab in sea-water, the soft shell very speedily imbibed sufficient fluid to distend it to its previous dimensions. This of course was simply the effect of endosmosis. Mr. Couch, in describing the moulting of the common Edible Crab (*Cancer Pagurus*), speaks of its *drinking* large quantities of water, and *thus* becoming distended; but I rather think that the distension takes place by endosmosis, even during life. There are two circumstances which militate against Mr. Couch's opinion:—first, the rapidity with which the distension occurred in the Crab I have just exhibited, while still in the act of moulting; and secondly, that after death the same distension occurred when the Crab was immersed in sea-water; in which case it could only be by endosmosis. Indeed to me it seems very probable that this very endosmosis, when the water once comes in contact with the new, uncalcified shell, may, by distending it, be the main agent in the breaking open and dis severing of the elements of the old shell.

On the Shell-bearing Mollusca, particularly with regard to Structure and Form. By ROBERT GARNER, Esq., F.L.S.

[Abstract of a Paper read before the Society.]

THE author commences the paper, of which the following is the substance, with some general observations on the morphology of

animals. He thinks that the idea of an ascending and successive scale or chain of creation is, in the main, correct, when the great classes, and not species or genera, are made the links,—the disturbing or modifying influences being due to modes of life, food, habitat, &c., and causing a different (say the quinary) distribution. He is an advocate, too, for the doctrine of one fundamental plan of organization, and thinks that, in the zoophyte, there is a real union of both the animal and vegetable *nisus*.

The great divisions of this chain, the *radiate*, *articulate*, *molluscous*, and *vertebrate*, constitute an ascending series; the links of the chain, so to speak, being in each case, for such an extent, of a particular pattern; but, nevertheless, one of the highest mollusks may surpass in organization one of the lowest fishes, or an articulate creature a mollusk. The author considers such great divisions of animals, as well as minor ones—the gasteropodous mollusks, for instance—as realities, and not mere abstractions; and that they are independent of the circumstances of food, habitat, locomotion, &c., just referred to. So great, however, are these disturbing influences, that they often produce an extraordinary external resemblance or pseudo-analogy between animals of a very different nature, as between a *Chiton* and an *Oniscus*, and they are connected intimately with, though not the cause of, what we call specific or generic distinctions. Aërial life, in contradistinction to aquatic, raises much the character of the locomotive organs; yet this is subordinate to type: hence the creeping Mollusk appears to have commonly a higher organization than the flying Insect.

The cartilages of *Sepia* have a true resemblance to those of a Skate, and the Cirrhipede truly connects the Mollusk with the Crustacean. The author regards *Dentalium* as a gasteropod, differing in this respect from Lacaze-Duthiers, whose beautiful paper, however, renders it supererogatory to say anything more on this animal, except that the author believes that the presence of the spiniferous tongue, of a proboscis, and the nature of the food, are favourable to his view: he also takes the feathery tufts to be the branchiæ.

The anatomy of *Aspergillum* is similar to that of *Pholas*; its mantle, however, is all but closed in front, and ends in an obliquely-set muscular disk, applied to the internal surface of the rose of the so-called *arrosoir*, the openings of this part of the shell giving exit to certain processes and fimbriæ of the fleshy disk,—a narrow slit being also left in both the muscular and shelly disks for the exertion of the small, compressed and curved foot. The

animal is enveloped within the shell by a rather horny, general membrane.

The author touches upon the anatomy of some other genera of Lamellibranchiata. *Solemya* has its firm, horny, dark cuticle doubled inwards from the valves over the tubular mantle; behind, it has an anal opening, and a second fringed branchial slit lower down: the branchiæ and tentacles are single on each side, the former being remarkably feather-like. The foot is similar to that of the *Solens*, but crenate round its anterior disk. *Cyrenoidea* has the mantle closed below, but with two openings behind, the upper one with a semicircular internal fringe, incomplete above; a callous rim and fringe surround the mantle, which has also a third opening for the long, compressed, bent, and blunt foot. This last has a remarkable crystalline body, directed from the stomach to the pedal pore, apparently, as in *Cardium*, subserving by its elasticity to the extension of the foot, and consequently to locomotion; at any rate, it is not a sexual distinction. The external branchiæ are short, and the upper or internal branchial cavity does not communicate with the lower one. The renal organ opens near the branchial nerve, and the ovary at the base of the abdominal mass. *Trigonia* is remarkable for its beautifully fringed, open mantle, its pectinated pits for the secretion of the teeth, and the large scythe-shaped foot, trenchant before and peaked behind, and having a fringed disk. *Vulsella* is allied to the Oyster, but more so to the Pectens, having a small cylindrical grooved foot and appended visceral mass, but no byssus; the rectum perforates the heart, and has a tentacle above its opening. *Perna* has a similar foot, and a very bulky byssus, with a large muscle attached to their base; the lips resemble those of the Oyster. The anatomy of *Crania* is little different from that of *Orbicula*, as described by Owen,—the beautiful arms folded in several coils, with a simple mouth at their base, the stomach and short intestinal canal surrounded by the liver and hearts, and terminating by a lateral bend; the ovaries ramifying in the mantle; the adductor muscles being four in number, with some bands to the mantle; and on the latter, glandular markings corresponding with the microscopic sculpture of the shell. With respect to *Anomia*, the author has again been anticipated by Lacaze-Duthiers, though he has already given, in another paper, most of its anatomy and morphology: he would simply call attention to its very long and curious crystalline stilette, unconnected with the minute foot.

With respect to that *quæstio vexata*, the sexes of the Lamelli-

branchiata, he observes that any number of individuals of *Cyclas* may be examined, and young fry will be found in the branchial laminae in all; that all Oysters have ova, and also all individuals of *Pecten maximus*, the subpedal mass being visibly composed of an ovary and a testis. He is obliged to believe that one species of British *Anodon* is universally oviferous. But the common Edible Cockle appears to have the individuals of different sexes, and the same may be said with regard to *Mytilus edulis* and *Patella*.

The spermatozoa in the Cockle are oblong and a little curved, and torulated, as it were, whilst they are pear-shaped in *Mytilus*; they are also extremely minute, and their appendages must be very fine, for with a power magnifying 500 diameters they are scarcely to be seen.

In the shell of a *Patella*, *Emarginula*, or *Haliotis*, we have the two conjoined valves of a lamellibranchiate mollusk; and through such forms as *Calyptræa*, *Hipponyx*, *Navicella*, and *Nerita*, we arrive at the ordinary form of the gasteropod with its operculum.

Then follows a disquisition on the progressive tendency to a spiral geometry in these animals, due to a varying plan of conformation, and not to the force of the heart, there being generally an atrophy of the left side of the body. In *Nautilus* and *Argonauta*, the shell and mantle are reversed in position to what they are in the Gasteropods, whilst *Sepia* and *Hyalæa* agree rather with the latter. The symmetrical shell of the lower Gasteropods undergoes a lateral torsion in the higher, spiral forms, to become again symmetrical in the Cephalopoda. The branchiæ in *Patella* retain a position analogous to that of the same organs in the Lamellibranchiata; in some Chitons they have a tendency to retract towards the anus, as in *Doris*; in *Fissurella* they waste at the sides and become developed above the neck, as in the spiral Gasteropods; but in them, the right branchia, and right side of the mantle are principally developed. From this torsion arises the form and spire of the shell. In *Aplysia*, where the branchial fissure is far back and to the right side, the right respiratory nerve preserves a superior position, and passes backwards to form its ganglion at the front of the branchial opening; the left, on the contrary, passes under the œsophagus to form a second ganglion, not mentioned by Cuvier, behind the first. In the more spiral Gasteropod the torsion is greater; the right nerve, for instance, mounts upwards over the digestive canal to form its ganglion quite in the left flank, whilst the left goes below the digestive

canal to attain the right flank. In *Sepia* the branchiæ are again symmetrical and abdominal.

The shell of the young *Sepia* is composed of distant plates, only connected by minute transversely striated laminæ or flattened tubes, producing by their insertion a beautiful appearance of sinuous lines, very like those of a Baculite or Ammonite; and the spongy part of the shell, so constituted, is probably filled with air from the cavity of the body situated immediately in front, the intervening membrane having a peculiar structure. This cavity of the body exists in much lower mollusks; air being apparently secreted in it, to lighten the animal.

The author thinks that, in considering the anatomy and form of the body of the Gasteropoda, about ten species may be taken as types of corresponding families.

1. *PATELLA and its congeners*.—He claims to have been one of the first to show the termination of the oviducts and renal organs between the processes of the branchiæ in the Chitons. As they are commonly phytivorous, the intestine is often very long and disposed in large coils, in double apposition; the buccal apparatus is very remarkable. *Chitonellus* differs but slightly from *Chiton*, the central elements of its tongue, however, being little developed, though having the same tessellated basement membrane. The tongue of *Emarginula* differs much from that of *Patella*, having an immense number of serrated side-hooks and a dilated middle portion.

2. *CALYPTRÆA, &c.*—The mollusks of this division have often supranuchal branchiæ, as have some of the last; the sexes also are frequently separate, rendering copulation necessary; and they are sometimes partially spiral, with a tendency to form an operculum. However, the little *Ancylus fluviatilis* appears to be what is commonly called hermaphrodite, with a branchial lamina on the left side, together with the heart and openings of the genital organs; the stomach has a cæcum, and the penis a long filiform appendage; the female parts opening near the rectum and behind the male organs. It must respire by water rather than by air, for, in a rapid stream, the stones at the bottom are covered with *Ancyli* (upon which also its round oothecæ, each containing four or five ova, are deposited), and it appears impossible for them to get to the surface to breathe. On the contrary, the lake-*Ancylus*, though the margin of its mantle is ciliated, may perhaps come to the surface, ascending the stalks of the Water Persicaria, on which it is mostly found, and on which its oothecæ are deposited. When the dark cuticle of this last minute creature is removed,

its organs may be seen to be reversely disposed to those of the larger species, the heart being placed to the right, before the apex of the shell, and the rectum also on the same side.

3. DORIS, &c.—The little *Doris aspera* swims, back downwards, on the surface of a glass of sea-water, copulates, and deposits its semicircular oothecæ. The brain of the common Lemon Doris is of a fine orange colour, enveloped in a glandular matter, and is constituted by a complicated assemblage of ganglia: there are acoustic sacs and dark ocular spots upon it. There are six ganglia on the buccal mass, and about six or eight minute ones on the stomach. The anal sac appears to be a purple- or ink-bag; and the so-called matrix is composed of a peculiar substance, swelling enormously in water, of which it renders a large quantity viscid, and being also coagulable by alcohol and bichloride of mercury, but not by heat. Spermatozoa were found in the genital vesicle, as well as in the epididymis and its cæcum. The spines of the lingual plate are uniform, and in number about 10,000.

4. APLYSIA, &c.—*Aplysia* has been before alluded to. Cuvier, in his generally beautiful drawings, has scarcely done justice to (5) *Ianthina*, nor to its beautiful float and ootheca; it is peculiar for its fins, and the disk at the back of the foot. With respect to *Magilus*, it should be removed from the (6) Tubuli-branchiata, its animal being a *Purpura* in structure, with a bent horny operculum, and a very long linear appendage on the right side of the head, leading to the supposition that the animals are of different sexes, though there seem to be difficulties in the way of sexual congress. In the specimen examined, the spire of the shell was not solidified; the animal had a short proboscis, with rather bent subulate feelers, and eyes on the outside; it had also a rich purple secretion near the rectum on the right side.

7. TROCHUS, &c.—Some of the species of *Trochus* surpass even *Emarginula* in the beauty of their lingual apparatus. The renal organ opens into the bottom of the branchial cavity, contrary to its disposition in *Helix* and *Lymnæus*, where its exit is near the respiratory orifice. In *Planorbis*, that part of the respiratory cavity receiving the excretions seems separated by an imperfect valve from the right portion. With respect to the secretion of this organ, it consists, in both Gasteropoda and Lamellibranchiata, of numerous pellucid globular bodies, containing opaque earthy nuclei or granules, and presenting different appearances in *Anodon* (for instance), *Cyclostoma*, *Buccinum*, and *Helix*. When these bodies are incinerated, lime is left, which in some cases appears to have been combined with oxalic acid. The little *Nerita litoralis* presents

the structure of the Turbonidæ very prettily and in small compass, particularly in the very long spiral tongue. *Delphinula* has the fringed mantle and sides and very wonderfully armed tongue of the other Trochidæ. *Melania* is of similar organization to our well-known *Paludina*, the stomach compound, the mantle and bilobed head fringed, and the latter marbled like that of *Paludina*. *Ampullaria* appears to be truly amphibious.

8. *BUCCINUM*, &c.—*Natica* presents much the same structure as the common *Buccinum*, but has a muscular disk anterior to the mouth,—a disposition, with some variations however, found in other mollusks. The first and second stomachs are at a distance from each other, the tongue is little developed, and the branchiæ (often single in the Turbonidæ) two in number. *Purpura* also differs but little from *Buccinum*. *Ovula* is a less attainable mollusk: the foot is long and rather narrow, and subventral rather than subtrachelian, with a sinuosity on the right of the neck, where also is a short hooked penis in the male, receiving a vas deferens from near the rectum behind; there is a large and small branchia, and the reflected portion of the mantle is covered with tubercles and tentacles,—no doubt a fine garnish in the living animal; the mouth has a muzzle, and there are small eyes on the external sides of the curved, awl-shaped tentacles; the elements of the tongue are beautifully toothed and serrated.

9. *LYMNÆUS*, &c.—Of the air-breathing aquatic and (10) terrestrial gasteropods the most interesting particulars are their generative organs, which the author proposes to re-examine. The brain of *Helix aspersa* is composed internally of pyriform or oval ganglionic vesicles, each giving origin to one or more nervous fibres. The acoustic sacs are similar to those of *Doris*. The nerves from the upper part of the ring are enveloped in a darkish neurilemma, and comprehend no doubt olfactory, optic, and tactile twigs; there being the buccal ganglia for taste, and the acoustic sacs for hearing; the twigs, however, forming the buccal or pharyngeal ganglia have a broad double root on each side, near the origin of the above three nerves. The lower part of the brain is very analogous to that of *Sepia*, giving off nerves to the foot, and external and internal respiratory ones to the mantle, respiratory opening, branchiæ, &c. *Lymnæus* has the cephalic ring formed by about twelve ganglia, exclusive of two large and two minute ones on the buccal mass. The upper portion of the ring has ganglionic swellings, but in other respects the nerves are as in *Helix*. Its lower portion consists of two pedal nerves, and has the

acoustic spot and a minute ganglion upon it; behind, this lower portion consists of five ganglia connected with both the anterior and upper swellings by a cord, but separated from the former by the aorta, as usual, and giving nerves to the flanks, pulmonary orifices and sac, heart, stomach, and viscera. The lower ganglia are bright yellow.

With respect to the Pteropoda, the branchiæ in *Hyalæa* exist as a delicate membrane under the swollen part of the shell, in structure much like the same part in the Ascidians, the inlet being through the anterior opening of the mantle. There are eyes at the fold of the mantle behind, and two small tentacles above the mouth; the heart and rectum being on the left side, and the generative opening at the base of the right ala. *Cleodora* is a very beautiful creature, with the same disposition and structure of viscera; brain-spots but no eyes were visible; the mantle had beautiful muscular bands; the branchiæ as above; the buccal apparatus is imperfect in both. *Cleodora* has similar membranous expansions with *Hyalæa*, and also a sort of triangular lip.

Argonauta has a lachrymal pore before and beneath the eye. The beautiful and obvious respiratory mechanism in the Cephalopoda needs not to be described. There is a large sac behind the viscera of the Argonaut, which opens on each side; it is perhaps of some hydrostatic use. There are at least three pairs of salivary glands, of which four open on the floor of the mouth, and two or three at the commencement of the gullet. Several small shells of Pteropoda and fragments of Cephalopods were found in the stomach, on which was observed the large nervous ganglion found in all these, as well as in lower mollusks. The branchial nerves have each two ganglia, of which the last at the root of the branchiæ is rounder than the other; the branchial hearts have processes as in *Sepia*. In *Sepia* two openings lead from the respiratory sac into the cavity containing the venæ cavæ and their secreting appendages often imbued with glittering crystalline particles, and from the above cavities a wider opening on each side leads into a second sac further back, situated in front of the shell. There are auditory sacs in the Argonaut. The oviducts have separate openings, but originate together. Both *Sepia* and *Argonauta* are infested with a subcutaneous filiform entozoon, hooked anteriorly and rolled up spirally in the former. *Loligo media* and *Sepiola* have but one oviduct, and the two large, glandular, laminated organs, opening at their summits, are wanting in *Argonauta* and *Octopus*. In *Sepiola* one would almost think that copulation takes place, for the

author has taken what he supposes to be the capsules of Needham, with dilated oval ends, tubular and bent pedicles or processes, enclosed elastic filaments, and adhering zoosperms, from the oviducts of the female: he has made the same observation also in *Sepia*. The latter has very similar male organs to *Octopus*, as described by Cuvier. In the embryo *Sepia*, the yelk enters below the mouth and opens into the upper stomach, but the beak of the animal also appears to be inserted into it behind. The vitellus in reality therefore enters by the foot, as it does in *Bulimus*, and probably in all Bivalves.

On the Linnean Manuscript of the 'Museum Ulricæ.'

By SYLVANUS HANLEY, Esq., F.L.S.

[Read Dec. 3, 1858.]

NOT the least important result of the investigations of the Committee appointed by the Linnean Society to examine the condition of the collections and manuscripts of Linnæus, was the rediscovery of a written copy of the 'Museum Ulricæ.' The volume was manifestly, from internal evidence, a legible transcript of the original manuscript of that work, with alterations and interpolations in the peculiar handwriting of the author. It was, indubitably, the unpublished catalogue so often mentioned in the tenth edition of the 'Systema,' and contains descriptions of certain species alluded to as defined, yet, strangely enough, omitted in the printed edition. It is worthy of notice for many reasons: it corrects the frequent misprints; explains the many fallacious allusions to preceding species, their sequence being very different; it exhibits those early synonyms, which, culled from comparison with the actually described specimens, had been eventually supplanted by supposed better representations; above all, it imparts to us those original headings, or diagnoses (condensed from the subsequent details), which had been suppressed, of old, in favour of those already published in the 'Systema.'

This wholesale substitution, adopted by Linnæus, as a ready method of avoiding a tedious revision of all the headings, when he absorbed in the more comprehensive groups of his 'Systema' the members of manuscript genera he had determined to reject, involved a serious amount of confusion; for, oftentimes, the species of the two works, although designated by the same appellations, were totally distinct; and the combination of the diagnosis of the one with the details of the other displayed an array of features not known to be associated in any object in nature.

The generic arrangement exhibited in the manuscript differs essentially from that which appeared in the final edition of his 'Systema Naturæ.' As a whole, it is decidedly inferior, yet it segregates certain natural groups, such as *Lyra* and *Cassida*, the value of which have been acknowledged by all modern naturalists. The following list and sequence of the genera comprised in it, cannot, indeed, be regarded as an entire system, for certain groups, viz., *Chiton*, *Lepas*, *Teredo*, *Sabella*, and the typical forms of *Mya*, *Mactra*, and *Anomia*, were not at that period represented in the Museum; but it is not devoid of interest, since it manifests a transitional stage in the progressive advance to that matured scheme which was finally elaborated in the pages of his revised 'Systema.'

Dentalium.	Haliotis.
Patella.	Nautilus.
Nerita.	Cymbium (=Argonauta).
Helix.	Spondylus.
Turbo.	Ostrea.
Trochus.	Pecten.
Turricula.	Arca.
Buccinum.	Pinna.
Lyra.	Mytilus.
Morion.	Solen.
Conus.	Tellina.
Voluta.	Chama (not that of the 'Systema').
Strombus (not that of the 'Systema').	Cunus (=Venus).
Harpago (=Strombus).	Pholas (not that of the 'Systema').
Murex.	Trunculus (=Donax).
Cassida.	Bucardium (=Cardium).
Cypræa.	
Bulla.	

Besides the four genera (*Chiton*, *Lepas*, *Teredo*, *Sabella*) that were excluded from this catalogue, either from the absence of specimens, or from mistrust of their being veritable Testacea, six of the remaining 32, namely, *Pholas*, *Mya*, *Mactra*, *Chama*, *Anomia*, and *Serpula*, were likewise omitted, not being yet eliminated from *Solen*, *Bucardium*, *Spondylus*, *Ostrea*, and *Dentalium*. To counter-balance these, we find no less than eight subsequently abandoned groupings:

Turricula (an undefined amalgam of the long-spined species of *Buccinum*, *Murex*, and *Strombus*).

Lyra (the *Harpa* and *Purpura* of the Lamarckian school).

Morion (an unnatural compound of *Eburna*, *Auricula* proper, *Pythia*, &c.).

Strombus (a combination of the immature members of the received genus with *Pyrula*, *Fasciolaria*, and other allied forms).

Cassida (nearly the modern *Cassis*).

Pecten (equal to *Lima* and *Pecten*).

Chama (the *Tapes* of recent conchologists).

Pholas (chiefly composed of *Artemis* and *Lucina*).

It may be remarked, moreover, that the simple univalves commence, and the bivalves close the series; the exact converse of the order in which they are marshalled in the two principal editions of the 'Systema Naturæ.'

I feel assured, after a careful study of the manuscript, that the names eventually allotted to the shells of the 'Museum' did not result from a careful comparison of the royal specimens with the typical examples in the private collection of our author, but were attached to the species, either from the identity of the written and printed synonymy, or from the general accordance of their described features with the meagre characteristics enumerated in the prior publication.

The erased nomenclature of the species, however, was very dissimilar, and was scrupulously based upon a supposed identity of the specimens with those delineated by Rumphius, Klein, and d'Argenville. Assuredly at that period of his career, our author entertained the same profound respect for the laws of priority which is professed by all modern naturalists; and I hesitate not to affirm that, from the crude and inharmonious theories of his predecessors, he eliminated a system of Conchology that was better suited to the requirements of the age he lived in than any more elaborate arrangement would have been. For simplicity attracts the student, whom a more complex (even if more natural) method would repel; and for the collection of an adequate mass of materials wherewith, eventually, to build up a more symmetrical and widely-based structure, a multitude of comparatively unskilled labourers is more efficacious than a small knot of the most erudite architects.

Before inviting the attention of my readers to the original headings of the 'Museum Utricæ,' and to my brief account of the variations in the written copy from the text of the printed version, I must premise, that it has not been my practice invariably to notice, in the summary, such trifling differences of construction as the preferential use of the ablative for the nominative case, where the verbal change involved no alteration of the precise meaning.

MUSEUM LUDOVICÆ ULRICÆ REGINÆ.

CONCHYLIA.

CHITON. LEPAS.

Nothing relating to these two genera was found in the copy.

PHOLAS.

The *Pholas* of the manuscript is perfectly dissimilar to that of the 'Systema.' Our author had evidently, when he first wrote the 'Museum Utricæ,' not appreciated the remarkably striking characteristics of this group, having located the only species he then knew (for *P. candidus* seems a subsequent discovery) with the *Solens*.

P. CANDIDUS. Not mentioned in the manuscript.

P. CRISPATUS. *Sol. ovatus, obtusissimus, cardinis dente depresso rotundato.*

The Appendix to Lister was not cited; "Habitat in Anglia, Suecia," was appended to the description, which in many respects was inferior to the published one. The account of the hinge was merely "Cardo dente dilatato rotundato extus excavato."

MYA.

The three incongruous forms assorted as *Myæ* were not so united in the MS.; the second being very properly placed with the *Mussels*, the other two ascribed to *Solen*.

M. LUTRARIA. *Sol. ovali-oblongus, cardine laterali dilatato semiorbiculato.*

In lieu of the reference to Lister (whose work does not appear to have been consulted by our author at the period when this portion of his manuscript was written), plate 45, figure N, of Rumphius was quoted as illustrative. The published account of the hinge is much more complete than the written one, which was apparently drawn up from a worn specimen; it ran as follows: "Cardo extus vix gibbus, intus constans laminis 2 semiorbiculatis concavis introrsum spectantibus."

By a slip of the pen, in my 'Ipsa Linnæi Conchylia,' I had termed Brown's figure of the Linnean *Mya lutraria*, *L. oblonga*, instead of *L. elliptica*.

M. PERNA. *Myt. lævis, cardine terminali unidentato.*

The intended name was *M. Magellanicus*.

M. VULSELLA. *Sol. oblongus, linguæformis, cardine terminali dilatato semiorbiculato.*

"Pinna linguaformis subfalcata" was written after the reference to the 'Museum Tessinianum;' hence it seems that Linnæus did not himself consider that he had used the binomial method in that work, or he would have quoted it as *P. lingulata*.

"Rumph. 148. t. 46. f. A," and "Gualt. t. 90. f. H," were the unpublished synonyms.

SOLEN.

Testa valvulis utrinque hiantibus. Cardo dente unico inflexo recurvo.

The *Mya lutraria*, *M. vulsella*, and *Pholas crispatus* were originally included in this genus.

S. VAGINA. *S. linearis* rectus, cardinibus unidentatis.

"Habitat in Indiæ littoribus arenosis : in mari Rubro (*Hasselquist*)" was the recorded locality in the MS., where the European shell delineated by Gualtieri was not then included: "Klein, 163. t. 11. f. 65" (a copy from the cited figure of Rumphius) was its substitute.

S. SILIQUA. *S. linearis* rectus, cardine altero bidentato.

The wretched drawings of Argenville were not quoted; but "Bonan. 2. f. 56" (error for 57), "Planc. t. 3. f. 6," and "List. Ang. 192. t. 5. f. 37," were cited instead.

S. ENSIS. *S. linearis* subarcuatus, cardine altero bidentato.

The final remark was not in the MS.

S. CULTELLUS. *S. ovali-oblongus* curvatus.

"Habitat in Amboinæ littoribus arenosis" is an addition of the MS. The intended name (derived from Rumphius) was *cultriformis*,

S. RADIATUS. *S. ovalis*, cardinis costa tereti.

"Habitat in littoribus arenosis Xulii (?) Amboinæ" is an addition to the published account. The intended specific name was *violaceus*, an appellation bestowed upon it by Rumphius: "*solida*" was an emendation.

S. STRIGILATUS. *S. ovalis*, oblique striatus.

"Bonan. 2. f. 76" (error for 77) was an unpublished synonym.

S. ANATINUS. *S. ovatus* membranaceus, costa falcata.

Rostrum anatis was the intended name.

TELLINA.

Testa altero latere inflexa. Cardo dentibus aliquot, raro lateralibus.

T. GARGADIA. *T. antice* rugosa, rima dentata.

The absurd "marginis posticum latus remotum" was a misprint for (dens) "marginis posticus, latus, remotus."

T. LINGUA-FELIS. *T. subovata* scabra.

"Klein, t. 11. f. 62" (cited in the 'Systema'), and "d'Arg. t. 25. f. G" (the description of which suits better than the drawing) are the additions of the MS.: "sesquiliore" was the printed emendation of "latiore."

T. VIRGATA. *T. ovata*, striis transversis retrorsum imbricatis, dentibus lateralibus.

The erroneous reference to d'Argenville was not present: "Klein, 158. Tellina virgata Rumphii" had been added by Linnæus. A very large portion of the printed account is wanting in the MS., to wit—"æquales. Intus radiis obsolete incarnatis picta." "Labris rugosis et scabris," "hymene tectis. Anus est rima concava," "primores," "transversi cum cavitate pro oppositis dentibus," "longitudinalem." The "retrorsum" was originally "sursum"; "dextrum" was "sinistram"; "Tertius dens" was "Altera testa."

T. GARI. *T. ovalis, striis transversis retrorsum imbricatis, dentibus lateralibus nullis.*

The G in the reference to Rumphius, and the F in the reference to d'Argenville were misprints for D and I, and were so published in the 'Systema': the "primoribus" was an emendation.

T. ALBIDA. *T. ovalis, lævis, nymphis prominulis.* "Primores" was an emendation. The species was unnamed.

T. FOLIACEA. *T. antice scabra, rima serrata.*

The Rumphian name "folium" was the intended appellation: "Klein, 162. t. 11. f. 64" was cited, as in the 'Systema': "aciatum" was the reading for the printed "acutum."

T. PLANATA. *T. ovata plana, transversim striata, marginibus acutis.*

The erroneous reference to Gualtieri (whose figure C looks more like the species than his G) is not to be found in the manuscript. The species was not named.

T. LÆVIGATA. *T. ovata lævis, nymphis intractis.*

The figure of *T. chloroleuca* in Rumphius was not quoted, neither was the hence-derived appellation attached: the "radiato" and "primoribus" were also subsequent additions.

T. RADIATA. *T. ovali-oblonga, longitudinaliter substriata, sutura posita canaliculata.* "Obsoletis" and "primores" were subsequent emendations.

T. ROSTRATA. *T. oblonga, antice angulato-rostrata.*

The *T. rostrata* of the final edition of the 'Systema' was assuredly the *T. Spengleri*, and with that shell solely will the printed account in the 'Museum Ulricæ' accord. But the five earlier lines of the description (save "et albus"), and the detailed dentition (except "fossula distinctus"), with the varieties *a, b, g*, and the same synonyms as in the tenth edition of the 'Systema,' appear in the MS. with the name *T. petasunculus* attached. Whether designedly or not, there was a pictorial definition of *T. vulsella* in the earlier 'Systema;' and if an author be not allowed to amend his description, *T. vulsella* is better entitled than *T. Spengleri* to the name *rostrata*. "Margo exterior parum repandum est" was written in the MS.

T. REMIES. *T. rugosa, suborbiculata.*

The expressions "hians," "primores," "remoti," and the last five words of the details were absent; "utrinque" followed "duo": "non" in place of "vix" was the earlier reading.

T. SCOBINATA. *T. scabra orbiculata.*

"Primores," and "in altera testa profunda fossula distinctus," were not in the copy.

CARDIUM.

Cardo dentibus baseos binis, marginis solitariis remotis acutis. Valvulæ gibbæ, hinc figura cordis.

BUCARDIUM was the epithet applied in the written copy to the members of this genus, to which the *Solen bullatus* of the 'Systema' was correctly referred. *Macra* had not then been separated.

C. COSTATUM. *Buc. sulcis costis elevatis membranaceis.*

The original description has been somewhat enlarged in the press, by the addition of "brevissimis," "et extrorsum flexis," "fossula distinctus; at vero ille sub ano quasi duplex": "minus vero ad latera sulcata," moreover, was simply "ad alterum latus": the only expression omitted in printing was "reflexus," which followed "Anus margine."

C. CARDISSA. *Buc. compressum, valvis carinatis, natibus contiguis.*

"Colum. Aqu. 19. t. 16" (cited also in the 'Systema') was quoted in the MS. from which the "vix," "subcontigui," "remotus, validus, fossula distinctus," were absent. The "Rima" was termed "subrotunda" instead of "cordata."

C. HEMICARDIUM. *Buc. subquadrilaterum: valvulis carinatis, umbonibus distantibus.*

"Fasciis" was a misprint for the original "facies": "sulcis convexis" was written "sulcis excavato-rugosis." There was no specific appellation.

C. MEDIUM. *Buc. subcordatum subangulatum; valvulis angulatis sulcatis lævibus.*

The prefatory remarks were the only portion of the printed description to be found in the MS. The species was not named, but was quoted in the 'Systema' before the publication of its details.

C. ACULEATUM (misprinted "muricatum"). *Buc. subcordatum, sulcis convexis, linea cava exaratis, versus apicem dentatis.*

The intended name was *verum*.

C. ECHINATUM. *Buc. subcordatum, sulcis acutis exaratis linea elevata ciliata aculeis inflexis plurimis.*

"List. Aug. 188. t. 5. f. 33, Pectunculus echinatus," "Bonan. 2. t. 90," "Gesn. Aq. 131, 132," "Faun. Suec. 1339," "Rondel. Aq. 22," were the original synonyms, to which our author had subsequently added "Klein, 139. t. 10. f. 40." "Alba" followed "gibba"; "parum antrorsum inflexis" was the reading for the printed "erectis subulatis"; "extrorsum" for the "uti extus": "brevioribus. Anus lævis, sutura simplici prominula," "recurvi," "fossula distinctus," were emendations.

C. TUBERCVLATUM. *Buc. subcordatum, sulcis obtusis nodosis transversim striatis.*

"Gualt. t. 71. f. M." was a correct additional synonym.

C. ISOCARDIA. *Buc. cordatum, sulcis imbricatis squamis fornicatis.*

"Klein, 138. isocardia fragum" had been interpolated by Linnæus; hence the name, which was not in the original. The "fossula distincti" has replaced the earlier "validi."

C. FRAGUM. *Buc. subcordatum subangulatum, sulcis notatis semicirculis elevatis.*

By the addition of "mala" to the erroneously cited figure of Gualtieri, our author has virtually repudiated it. "Spinosa" followed "Pruni;" the fallacious "s. rubris" was not present, nor "sæpe" either; "antere" stood in the place of "postico," and "postico" in that of "antico." The

descriptions of the "rima" and "anus" have been added: "recurvati" and "fossula distincti" were amplifications.

C. UNEDO. *Buc. subcordatum, sulcis lunulis coloratis.*

C. MURICATUM. *Buc. subrotundum sulcatum, lateribus muricatis.*

C. MAGNUM. *Buc. oblongum, sulcis angulatis latere serratis.*

I had hoped to have found the 19 a misprint, but the MS. and the printed copy agree precisely in every particular.

C. FLAVUM. *Buc. subovatum sulcatum, latere altero scabrum, altero dentatum.*

The redundant "subovata" was not in the copy, where the remark was made that the species resembled the shell subsequently termed *Chama cor*, the figure of which (Gualt. t. 71. f. E.) had been cited, but erased in the MS. The ideal hence derived is a very different shell from the one supposed identical. No mention is made of lateral teeth: was it then a veritable *Cardium*?

C. LÆVIGATUM. *Buc. ovatum, striis læviusculis longitudinalibus.*

I do not consider this (the *B. striatum* of the MS.) to be identical with the *C. lævigatum* of the 'Systema.'

C. SERRATUM. *Buc. ovale læve, antice serratum.*

"Ovata" stood in the place of the printed "obovata": "curvatus" and "parvi" were subsequent to the MS.

C. TRISTE. *Buc. ovatum læve, rima anoque obsolete striatis.*

The 'Museum' was referred to for this shell previously to the publication of the details. Curious to relate, the species was wholly omitted in the twelfth edition of the 'Systema.' It was, in all probability, a *Mactra*, which genus had not been constituted at the period when the description of *C. triste* was issued.

C. PECTINATUM. *Buc. subcordatum, striis hinc longitudinalibus, illinc transversalibus.*

The erroneous reference to Gualtieri was not present in the written copy.

Mention was made in the 'Systema' of a *Solen bullatus*, for a more detailed account of which the reader was referred to the 'Museum Ulricæ.' No such species appeared in the published edition; but the omitted shell (a veritable *Cardium*) was thus described in the unprinted version:—

BUC. BULLATUM. *B. subrotundum, antice crenato-hians.*

Rump. 143. t. 44. f. N. Pecten bullatus.

Testa subrotunda, inflata, gibba, fragilis, pellucida, substriata, rufo nebulosa, antice hians, margine serrato. Umbones tumidi, obtusi, reflexi. Rima minima brevissima. Ani regio obsoleta. Dens cardinis fere unicus, minimus. Marginales solitarii, remoti, compressi, majores.

DONAX.

TRUNCULUS was the proposed name of this genus, which was thus characterized:—

Testa compressa, antice obtusissima, retusa. Cardinis dentibus 2, marginis unicus.

D. SCORTUM was wisely omitted.

D. PUBESCENS. *Trun.* antice spinis ciliatus.

D. RUGOSA. *Trun.* antice rugosus, marginibus crenatis.

The printed "cuneiformis" has replaced the earlier "majuscula"; and "crenulatis" was originally "undulatis." "Intus subviolacea est" was not in the written copy.

D. TRUNCULUS. *Trun.* antice lævis, marginibus crenatis.

The reference to Klein was not in the original, but "d'Arg. t. 25. f. L." was quoted (as in the twelfth edition of the 'Systema'). The last seven words printed were not in the copy. The intended name was *gibbus*.

D. CUNEATA. *Trun.* cuneiformis, marginibus integerrimis.

The final remark was not in the copy, where "parva, ovata," preceded "cuneiformis." The then unpublished details were quoted in the 'Systema.'

D. SCRIPTA. *Trun.* ovatus lævis scriptus.

The erroneous citation of Gualtieri (a misprint for 88. f. Q.) was not in the copy, and, as the figure represents the *D. trunculus* in the page opposite, I suspect was carelessly placed here by the printer, when our author had inserted it in his revised proof. I suspect this error often occurred, as for instance in *Tellina planata* and *radiata*, where Gualtieri's figure (added during revision) was attached to the former instead of to the latter. "Margo interne crenulatus," and nearly the entire account of the teeth, were emendations.

D. MURICATA. *Trun.* ovatus, striis muricatis, margine denticulato.

"Postice solitarii" followed the final "utrinque": "primores" was an emendation.

VENUS.

This genus (as a whole) was not to be found in the manuscript System. Its components were distributed into three groups, two of which bore names that were subsequently allotted to forms very remote from those therein so designated.

CUNNUS. Testa subrotunda. Rima nymphis instructa. Dentes cardinis 4, lateralibus divaricatis versus latera. This contained the bulk of the *Veneres*, all except Nos. 63, 66, and those referred to *Pholas* and *Chama*.

PHOLAS. Testa lenticularis. Rima fissa, destituta nymphis. Dentes cardinis 1 s. 2, marginalis tantum intra anum. *V. Pennsylvanica*, *incrustata*, *punctata*, *edentula*, *exoleta*, *scripta*, *pectinata*, *ziczac* were its constituents.

CHAMA. Testa ovalis cum angulo. Cardo dentibus 4 confertis, quorum unus in singula valvula bifidus. In this were located *V. literata*, *rotundata*, *decussata*.

V. DIONE. *Cun.* cordatus, antice pubescenti-spinosus.

The same references to Petiver, Olearius, and Lister were present as in the 'Systema.' The final remark was an addition. The proposed name was *C. Veneris*.

V. MARICA. *Cun. subcordatus, decussatim striatus, pube lamellosa.*

V. DYSERA. *Cun. testa subcordata, sulcis transversis reflexis, labiis concavis incumbens.*

Neither "Huic rugæ, &c.," "lævis," nor the synonym of Lister were in the original.

V. CHIONE. *Cun. subovatus, lævis.*

The erroneous reference to d'Argenville was not inserted in the MS., from which "lanceolatus," likewise, was absent.

V. MACULATA. *Cun. testa ovato-cordata lævis.*

"Lanceolata" and "ovato-oblongus" have been additions. The observation that it was difficult to distinguish this shell (which was not named in the MS.) from the following, would mislead one, since the remark referred to two unpublished species, which it originally preceded.

V. MERETRIX. *Cun. subcordatus glaber, labris gibbis, nymphis apice hiantibus.*

C. vulgatus was the name originally designed.

V. CASTRENSIS. *Cun. suborbiculatus glaber, characteribus scriptus.*

V. MEROE. *Cun. sutura postica hians.*

V. FIMBRIATA. *Cun. subrotundus decussatus rugosus, longitudinaliter striatus.*

D'Argenville was not referred to.

V. RETICULATA. *Cun. subcordatus, striis crenatis decussatis, anocordatus.*

V. TIGERINA. *Cun. suborbiculatus, striis crenatis decussatis, anovatus.*

The name was an error, having been derived from the "Lingua tigrina" of Rumphius (his figure G., not H.): *fuliginosus* was the one originally intended.

V. PROSTRATA. *Pho. orbiculata, transverse striata, labiis scabromembranaceis.*

The unpublished details had been previously referred to in the 'Systema.'

V. PENNSYLVANICA. *Pho. glabra, rugosa, antice sulco longitudinali.*

"Habitat in Pennsylvania," and "subdiaphana," were the unprinted additions. The "margo interne crenatus," "nates sub-recurvatæ," and "color intus versus marginem violaceus," were not in the copy. The last character (so utterly inappropriate to the features of *Lucina P.*) was, I suspect, intended for *punctata* on the page opposite.

V. INCRUSTATA. *Pho. glaberrima lævissima, punctis excavata.*

The details were referred to in the 'Systema' before their publication.

V. PUNCTATA. *Pho. longitudinaliter sulcata.*

The G in the reference to Rumphius was a misprint for the written D, from which figure ("Chama pectinata") our author had proposed to borrow the specific name, but subsequently had preferred the published designation. "Klein, 147. Actinobolos æquilatera" has been added to the MS. by Linnæus.

V. EXOLETA. *Pho. decussatim striata.*

The original synonymy and details have been so transmuted in the press, that it is manifest that the amended (!) species was perfectly distinct from the shell originally designed. The name of the latter was *clathrata*, and the declared sculpture was not merely "transversim," but "et longitudinaliter" likewise (in place of "striis retrorsis"). The reference (added by Linnæus) was not to Gualtieri, but to Lister, 335, f. 172, and its copy in Klein (t. 10. f. 52), both which would have more appropriately been assigned to *V. reticulata*. The *V. exoleta* having been previously defined in the 'Systema,' this confusion becomes of little importance.

V. ZICZAC. *Pho. striis transversis membranaceis erectis.*

The number which indicates the position of this species in the 'Museum' has been subsequently ('Syst.' ed. 12) referred to *V. cancellata*, yet, judging from the generic appellation (and consequent dentition), it could scarcely have been that well-known species. The "lentiformi" of the 'Systema' (ed. 10), where the name *ziczac* first appeared, forbids the annexation; but, although the details of the 'Museum' were there referred to, the obnoxious word was not mentioned in that publication. The following are the printed emendations (?): "lævis, et quasi excisa," "compressa," "variat colore albisimo."

V. PECTINATA. *Pho. sulcis longitudinalibus nodosis, antice antrorsum ramosa.*

The additional synonym of "Gualt. D. 75, f. A." appears in the MS., where "quam reliquæ" follows "orbiculata," and in place of "In area antica" may be read "et a primo sulco." The details there terminate with the word "lanceolatum." "*Ramosa*" was the intended name.

V. SCRIPTA. *Pho. striata, postice angulo recto circumscripta.*

The incorrect figure of d'Argenville was not indicated.

V. EDENTULA. *Pho. subgloboso-lenticulata rugosa edentula.*

V. LITERATA. *Cha. transversim striato-ovata.*

The earlier reading of confertim was "profunde"; "striis crenulatis antice et postice," "lanceolata," and "tres s." were absent.

V. ROTUNDATA. *Cha. transversim striata ovata absque angulo.*

The printed additions are "varius in variis," "aut albis," "lanceolata," and the final remark. There was no name attached in the MS.

V. DECUSSATA. *Cha. testa ovata, decussatim striata.*

"Sæpe" and "minimus" are the sole printed additions.

Probably the *V. Phryne* of the 'Systema' was designed by the following unpublished description:—

CUN. VENOSUS. *C. subcordatus lævis lateribus rugosis. Testa cinerea, nuce coryli major, gibba, glabra, antice et postice transversim sulcata. Margo exterius tantum denticulatus, non vero apex externus, aut margines laterales.*

The *V. macrodon* answers fairly enough to this definition.

SPONDYLUS.

This very natural genus was confused with *Chama*, and thus characterized :—

Testa imbricata. Cardo e callo gibbo oblique inserto fossula obliqua.

S. GÆDEROPUS. *S. imbricatus auritus, cardine dentato.*

"Rumph. t. 48. f. 1," "Gualt. t. 99. f. E. F. G," "Bonan. 2. f. 21," "Rondel. c. 40. p. 41," were the additional synonyms of the MS. The "ad cardinem truncata" was an emendation for the previous "breviore": the "superiore" a misprint for the written "inferiore": the final remark was not present.

S. REGIUS. *S. spinosus sulcatus inauritus, cardine dentato.*

No name was attached to this species: the previous one had been termed *Pectinites*.

S. PLICATUS. Not mentioned in the manuscript.

CHAMA.

The members of this genus were included in *Spondylus*, except *cordiformis*, which was referred to *BUCARDIUM*.

C. GIGAS. *Sp. plicatus squamosus, ano hiant e crenato.*

The species as originally defined was more comprehensive in its details than when printed; for the restricting "decussatim" had not been added, and "Gualt. t. 93. f. B." was an additional synonym. The printed additions were "obsoletis," "Margine reflexo," "exteriore duplicato longiore," and the final remark. *S. imbricatus* was the intended name.

C. HIPPOPUS. *Sp. plicatus muricatus, ano retuso clauso dentato.*

"Arg. t. 26. f. H." was an additional synonym of the MS.: the printed 20 should have been 10, as written: "ut in præcedente" was an emendation: *S. asper* was the proposed name.

C. LAZARUS. *Sp. imbricatus.*

Seba was not cited: "obliquam" followed "fossam" in the MS. "Elevatis," "longitudine testæ," "productiore," "instar auris," formed no portion of the early description.

C. ANTIQUATA. *Sp. subcordatus, sulcis perpendicularibus transversim striatis.*

No name was attached to the original details, which appear to have been altered ("in aliis minimum cordatum impressum fuscum"), and the synonym of Bonanni added, in order to comprise that species (*Cardita sulcata*) which had been pictorially defined in the 'Systema.' "Gibba" was preceded by "admodum": "obsoletis" was not present. *Cardita bicolor*, var. *unicolor* was probably intended.

C. SEMIORBICULATA. *Sp. semiorbiculatus compressus, decussate striatus, rudis.*

"Interior" was the earlier reading of "primarius."

C. CORDATA. *Sp. cordatus, transversim striatus, hinc elongatus, compressus.*

C. OBLONGA. *Sp.* oblongus, antice angulatus, dentibus anticis acutis.
 "Unico" (error for "unicus") originally preceded "in altera valvula."
 C. CORDIFORMIS. *Buc.* subrotundum læve, umbonibus recurvatis.

The brief description in the 'Systema' had evidently been copied in the manuscript by our author himself, who cited Gualt. t. 71. f. E. as the sole synonym. The specimen had apparently been added to the collection, subsequently to the drawing up of the first catalogue.

ARCA.

Testa crassa, umbonibus distantibus intus fornicatis. Cardo planus, masticatus dentibus numerosis minimis æqualibus transversis.

A. TORTUOSA. *A.* oblonga obliqua, valvula altera oblique carinata.

"Nates, &c." and "Cardo, &c." were the printed additions to the earlier description. The 'Systema' synonyms of Klein (t. 8. f. 16) and Bonanni (2. f. 128) were present in the manuscript.

A. NOÆ. *A.* oblonga angulata hians.

This manuscript furnishes us with the additional synonyms of

"Aldrov. 3. p. 513." and "Sloan. Hist. 2. p. 257. Musculus Matthioli," besides the previously published references to Lister (368. n. 208) and Bonanni (2. t. 32). The formation of the hinge was not, however, indicated, and the passage commencing with "Nates" has been enlarged from "Umbones remotissimæ, area interjecta concava, ad angulum rectum striata. Margo exterior in medio hians, apertura barbata."

The intended specific epithet was *A. Noemi*.

A. ANTIQUATA. *A.* testa oblique cordata, transversim sulcata, antice angulo compresso, rima intra rhombum transversim striata.

The admixture of two species (at the least) in the published edition resulted from the amalgamation of two earlier descriptions. To the above diagnosis belonged the printed details with the following important changes. In place of "extus striata longitudinaliter sulcis crenatis," the reading was simply "intus striata longitudinaliter," and in lieu of "interjecto spatio rhombeo plano," merely "rima patens."

The proposed name for this shell, from a supposition of its identity with the *Pecten virgineus* of Rumphius, was *A. virginea*. The other species which Linnaeus referred to the same numerals of the 'Systema' was not named, but was thus characterized:—

A. (Sys. n. 144). *A.* cordata, sulcis nodosis, rima decussatim striata.

List. Hist. Pecten polyleptoginglymus, &c.

Gualt. t. 87. f. C.

Testa reliquis magis gibba, albido-flavescens, sulcis xxx obtusis, transversim nodosis: nodis transversis, obtusissimis, imbricatis. Intus albida. Margo dentibus xxx argutiusculis. Rima sulco rhombeo circumscripta, disco decussatim vix manifeste striato. Umbones distantes ad neutrum latus flexi.

A. SENILIS. *A.* oblique cordata, octosulcata, lævis, antice hians, rima obtusangule striata.

Lister (without numerals!) was referred to in illustration; the early unimproved account of the beaks and ligamental area ran as follows: "Umbones distantes, oblique incurvati. Rima hians striata transversim ad angulos acutos": "et profunde immersis" was an addition.

A. GRANOSA. *A. subcordata, sulcis muricatis, rima obtusangule striata, utrinque angulum formante.*

The name was evidently borrowed from Rumphius, whose *Pecten granosus* ("143. t. 44. f. K.") was referred to in the manuscript, though neither quoted in the printed copy nor in the 'Systema' (ed. x.). "Bonan. 2. n. 73," and Lister (without numerals) were also cited.

A. DECUSSATA. *A. lenticularis, decussatim substriata, apicibus reflexis.*

For a detailed account of this shell, to which no specific name was attached in the MS., the 'Museum Ulricæ' was referred to, previous to its publication.

A. PALLENS. *A. lenticulari-subobliqua, decussatim striata, rima brevi.* This was the type referred to in the 'Systema.'

A. PECTUNCULUS. *A. lenticularis sulcata, decussatim rugosa.*

"Arg. t. 27. f. B," and Lister without numerals appended, were the unpublished synonyms. The expressions "leviter," "exteriore tenui; sulcata," "in arcum," were not parts of the original copy, which contained, however, the unprinted paragraph "latere interiore margine prominente notato." There was no specific name attached to either this or the next species.

A. GLYCIMERIS. *A. lentiformis, transversim substriata, rima lævi.*

The '*Chama glycimeris Bellonii*' of Lister (t. 247) was an unprinted synonym.

The following suppressed description of an unnamed Ark that was allied to, if it were not, *fusca* or *barbata*, was found in the manuscript. The 'Museum' had been referred to in the synonymy of the latter in the 'Systema,' but the species was not mentioned in the published version.

Arca ovalis, compressiuscula, apicibus subcontiguus.

Testa rudis, ferrugineo-fusca, longitudinaliter striata, striis quasi ex punctis callosis concatenatis, alternis striis majoribus ovatis, parum obliqua, minus lateribus gibba, rotunda absque angulis. Margo æqualis, edentulus. Apices recurvi fere tangunt se invicem. Rima dentibus minutissimis, antice longius extensa, nec recta.

OSTREA.

The very natural genus *Pecten* was separated from the unsymmetrical oysters, with the following definition:—

PECTEN. Testa subrotunda, altera planior, basis transversa, anguli transversi (auriculæ) ad basin. Cardo cavitas conica, striis utrinque 3 longitudinalibus obliquis.

The genus OSTREUM, enlarged by the addition of the true oysters confounded with the *Mytili*, the *Meleagrina*, *Aviculæ*, and the *Anomia placenta*, was thus characterized:—

O. MAXIMA. *Pec. radiis 14 rotundatis longitudinaliter striatis.*

In place of Gualtieri, "List. Ang. 184. t. 5. f. 29. Pecten maximus," and "Faun. Suec. 1343" were referred to: these synonyms had been added subsequently to the description.

O. JACOBÆA. *Pec. radiis 14 angulatis, fornicis longitudinaliter striatis.*
The cited drawing of Gualtieri was not mentioned.

O. ZICZAC. *Pec. radiis 18 explanatis.*

No specific name was attached to this, the preceding, and the next two species.

O. STRIATULA. *Pec. radiis 16 oblitteratis, transverse membranaceo-striatis, margine integerrimo.*

O. MINUTA. *Pec. radiis 20 convexis.*

O. PLEURONECTES. *Pec. radiis 12 duplicatis, extus lævis.*

O. OBLITTERATA. *Pec. radiis 24 duplicatis, extus lævis.*

O. RADULA. *Pec. radiis 6 convexis decussate striatis, margine crenato, auriculis æqualibus.*

O. PLICA. *Pec. radiis 16 convexis læviusculis, decussato-striatus.*

No specific name was appended to either this, the next, or the two preceding species.

O. PALLIUM. *Pec. radiis 12 convexis, striatus, scaber, squamis imbricatus.*

This with the remainder of the *Pectens* (as far as *flavicans*) formed a group characterized by "Auricula altera intus ciliato-spinosa."

O. NODOSA. *Pec. radiis 9 nodoso-vesicularibus.*

O. PES-FELIS. *Pec. radiis 9, lævis, fornice squamis fornicatis.*

The printed diagnosis, or heading, was evidently drawn up from a different shell.

O. PELLUCENS. *Pec. radiis 9, lævis, fornice squamis cochleari-hemisphæricis.*

No name was attached to this or the next shell.

O. SANGUINEA. *Pec. radiis 22 scabris, semiauritus.*

The reference was not to plate 74 (as printed) of Gualtieri, but to plate 73. "Purpureus nigro undatus" was written after the indicated colouring.

O. VARIA. *Pec. radiis 30 scabris explanatis.*

"Et omnia eadem" followed "sanguineæ"; "striis compressis echinatis" was not present; "color pallidior" was in the place of "concolor."

O. PUSIO. *Pec. radiis 40 filiformibus.*

O. GLABRA. *Pec. radiis 10 lævibus planiusculis, internis striis elevatis duplicatis.*

Gualtieri's rude drawing was not quoted.

O. OPERCULARIS. *Pec. radiis 20 subrotundis, decussate striato-scaber, operculo convexiore.*

O. GIBBA. *Pec. radiis 20 glabris, gibbus.*

Brown's drawing was not quoted.

O. FLAVICANS. *Pec. radiis 8 striatis, margine altero rotundato.*

As in the 'Systema,' the next two shells, along with this, formed a group distinguished as having the "Valvulis altero latere magis gibbis." No

names had been appended to this, the three preceding, and the two following species.

O. FASCIATA. *Pec. radiis 20, auriculis æqualibus exoletis.*

The "gibba" of the borrowed diagnosis was not, it may be observed, in the original.

O. LIMA. *Pec. radiis 22, imbricatis squamis, altero margine rotundato, auriculis oblitteratis.*

The "gibba" of the borrowed heading was not in the original diagnosis. The final remark was likewise absent.

O. ISOGNOMON. The entire account of this species was added to the copy in the Linnean handwriting. "Klein, 128. t. 8. f. 15. Isognomon" and "Cardo ut ephippo" had been omitted in printing.

O. MALLEUS. *O. trilobum.*

"Transverso ad marginem" was a subsequent addition.

O. FOLIUM. *O. ovatum, lateribus obtuse plicatum.*

Klein's copy (t. 8. f. 22.) of the indicated figure in Rumphius was cited, in the handwriting of Linnæus: "the "cavitate conica" was an emendation.

O. EDULE. *O. subrotundum semiorbiculatum, valvula altera plana integerrima.*

There was no semicolon after "opaca," but a comma after "latiore." The original sole synonym was the omitted one of "Gualt. t. 102. f. B."

O. SEMIAURITUM. *O. semiauritum ovatum læve, basi obliqua.*

Linnæus himself had added this species to the earlier catalogue.

O. EPHIPPIMUM. *O. submembranaceum curvum, cardine octosulcato.*

In addition to the published *Ostrea*, the following description of the shell subsequently termed *O. perna* (Syst. ed. 12.) was found in the manuscript:—

O. rugosum, inæquale, tumidiusculum, cardine octocrenato.

Testa perniformis, obovata, substantia ligni antiqui, tumidiuscula, superficie obsolete rugosa, inæquali, interne livida. Cardo transversus, margine inflexo, notatus crenis obtusis circiter 8.

ANOMIA.

The single species here mentioned was comprehended in *Ostreum*.

A. PLACENTA. *O. orbiculatum planum pellucidum.*

Reference was made, by a long periphrasis, to plates 225, 226 of Lister's 'Historiæ'; Seba was not quoted: "intra discum testæ adnatis" was absent.

MYTILUS.

Testa opaca, læviuscula. Cardo nullis dentibus instructus, sed fossula obliqua intra marginem.

This definition very properly excluded the oysters which had been erroneously inserted in this genus. Only the *Mytili* and *Modiolæ* of Lamarck were left as members; for *margaritiferus* and *hirundo* were transferred to *Ostreum*!!

M. FRONS. *Ost. acutum plicatum, labio altero scabro.*

M. CRISTA-GALLI. *Ost. acutum, plicatum, labio utroque scabro.*

The reading of the MS. was not "secundum marginem insculptus," but "secundum marginem Mytilus."

M. HYOTIS. *Ost. subacuto-plicatum imbricatum squamis compressis, labio utrinque glabro.*

M. MARGARITIFERUS. *Ost. semiauratum, imbricatum tunicis, basi transversum.*

"Bonan. 2. f. 1." was the omitted synonym. The description of the hinge was not at first inserted.

M. UNGUIS. *M. subrotundus, longitudinaliter striatus, pellucidus.*

This ambiguous species was not named, but placed next to *Ostrea edulis*. I entertain but little doubt of its being a young *Perna*.

M. LITHOPHAGUS. *M. cylindricus.*

Neither Gualtieri nor d'Argenville was referred to, which confirms my idea that the species of the 'Museum' (termed *coriaceus* in the manuscript) was not the Mediterranean *Lithodomus*.

M. BILOCULARIS. *M. striatus, cardine fornicato.*

M. EXUSTUS. *M. striatus, dorso angulato.*

M. EDULIS. *M. lævis, subcurvatus, cardine terminali mutico.*

The printed synonyms are additions. From the "crassa," and the "absque denticulo," it is by no means improbable that some large exotic species was intended. The proposed name was *niger*; and that word originally formed part of the heading, but had been erased by Linnæus.

M. UNGULATUS. *M. læviusculus, valvis obliquis postice dilatatis, antice apice.*

"Lineis" was "tunicis" in the original. I do not consider that the details of this species (the *M. rusticus* of the MS.) pertain, even generically, to the *ungulatus* of the 'Systema.'

The large *Mytilus* represented by Gualtieri was not quoted: the reference, on the contrary, was to the two *Modiolæ* depicted by Rumphius ("Rump. 151. t. 46. f. B. C.") and to their Kleinian names ("Klein, 127. *Musculus acutus vulgaris*, a. b."); and to that genus, rather than to *Mytilus*, does the account of the suture, and the final remark, apply.

M. MODIOLUS. *M. lævis, cardine sublaterali, margine dorsali dilatato.*

The erroneous, yet approximate, synonyms of Rumphius and Gualtieri (the 4 H's of whose engraving represent 4 different shells) were not quoted in the original. The species (for want of a good figure) was not clearly defined until the twelfth edition of the 'Systema.'

M. VIRIDIS. *M. lævis membranaceus, cardine terminali.*

M. RUBER. *M. rugosus, valvulis obliquis, postice dilatatis, margine antico apicem æquante.*

The preceding mussel spoken of was not *viridis*, but *ungulatus*. The reading was not "brevissimo, compresso," but "brevissime compresso."

M. HIRUNDO. *Ost. valvis bilobis, lobo anteriore angustiore longiore.*

"Bonan. 2. f. 57" (error for 58) and "List. 220. f. 55" were quoted.

PINNA.

The definition was not precisely similar in words to that of the 'Systema,' but the sense varied but little. It ran as follows:—

Testa oblonga, membranaceo-fragilis, basi angustata. Cardo nullus, sed valvis altero latere coadunatis ut una appareat.

P. RUDIS. *P. rugosa squamis fornicatis per seriem digestis.*

The name of this shell, identified (I think wrongly) by our author with the one he had termed *rudis* in the 'Systema,' was originally *fornicata*.

P. NOBILIS. *P. squamis canaliculato-tubulosis subimbricatis.*

P. MURICATA. *P. striata, squamis concavis ovatis acutis.*

"List. Hist. t. 370. no. 215," and "Sloan. Hist. i. p. 254," were present among the original synonyms.

P. ROTUNDATA. *P. squamis obsoletis, testæ margine rotundato.*

P. SACCATA. *P. nuda saccata erectiuscula.*

P. DIGITIFORMIS. *P. nuda digitiformis incurva.*

P. LOBATA. *P. nuda lobata.*

In addition to the printed species, an anomalous *Pinna*, which I doubt not was the *Lingula anatina*, is here described.

P. VIRIDIS. *P. ovalis, basi compressa.*

Generis dubii huc relata, donec certiora determinantur.

Testa utraque ovali-oblonga, viridis, intus magis pallida; quasi compressa, et fere naviculata, acutior.

ARGONAUTA.

The intended name of this genus was *Cymbium*, the one applied to it by Gualtieri.

A. ARGO. *Cym. carina dentata.*

"Bonan. 1. f. 13," and "Klein, 3. t. 1. f. 3," were the unprinted synonyms. The intended specific epithet was *C. papyraceum*.

NAUTILUS.

There was no definition of either this, or of the preceding genus, in the written catalogue.

N. POMPILIUS. *N. apertura cordata, anfractibus contiguis.*

The unprinted synonyms were "Bonan. 1. f. 1, 2," "Breyn. Polyth. 14," "Pet. Amb. t. 3. f. 7," "Pet. Gaz. t. 99. f. D," "Klein, 2. t. 1. f. 1, 2," and "Bellon. Aquat. 318. t. 382." Seba was not quoted.

N. SPIRULA. *N. apertura orbiculari, anfractibus distantibus.*

The I in the reference to Rumphius was a misprint for the written 1; "Bon. 1. f. 39," "Breyn. Polyth. 21. f. 2," "Klein, 5. t. 1. f. 6," and "Petropol. Mus. 532. n. 6," were the unprinted synonyms: "tubo" was an emendation.

CONUS.

Testa oblonga, cylindrica, deorsum attenuata. Apertura longitudinalis. Labium edentulum. Os non reflexum. Columella integra.

This most natural genus had the precise limits ordinarily assigned to it.

C. MARMOREUS. *C. conicus fuscus, maculis ovatis albis.*

"Bonan. 3. f. 123" was an additional synonym; the "versus basin transverse striata," and "subtruncata, apice prominulo," with the account of the variety, were not found in the MS.

C. IMPERIALIS. *C. pictus fasciis flavis cingulisque linearibus albo fuscoque articulatis.*

The "obconica" was simply "conica"; there was no description of the spire.

C. LITERATUS. *C. conicus albus punctis fuscis.*

The spire was not described: the reference to d'Argenville was I, not Q.

C. VIRGO. *C. striis convexis lævibus, basi cærulescente.*

"Longa" was originally "magna": the erroneous reference to Gualtieri was not inserted.

C. CAPITANEUS. *C. conicus, basi fusca, spiræ anfractibus adscendentibus.*

At least two species were confused; but, from the heading, it is clear that *C. generalis*, rather than *C. capitaneus*, was the typical form: the latter was the variety *g*.

The V in the reference to Rumphius was a misprint for the written Y: "Gualt. t. 20. f. G." and "Pet. Gaz. t. 27. f. O." were additional synonyms. "Notata lituris undatis fuscis" was not in the manuscript.

C. PRINCEPS. *C. flavus, lineis fusco-purpureis longitudinalibus ramosis.*

"Sub" preceded "convexa."

C. AMMIRALIS. *C. basi punctato-scaber.*

After "summus" was written "cingulo albo"; after "ordinarius," "cingulo nullo"; Seba was not quoted; "pruniformis" was the earlier reading for "conico-convexa, pyriformis." The variety *a*. was described as "circumdata lineis numerosis albis nigro articulatis, quarum quæ cylindrum distinguit a spira latior maculis albis nigrisque majoribus alternantibus." The variety *g*. was not originally present in the catalogue, but was interpolated by Linnaeus. "Hæc pretiosissima ut vendita fuerit 500 florenis" was the final remark.

C. NOBILIS. *C. subcylindricus lævis glaber, spira acuta argute canaliculata.*

"Cacumen" was a misprint for the written "acumen."

C. GENUANUS. *C. pictus cingulis linearibus albo fuscoque articulatis.*

A strange confusion took place between the details of *C. senator* and *C. Genuanus*. The published description belonged to the former, the synonym to the latter, and should have preceded the following brief description:

"Testa conica, pallida, glauca, oblongiuscula. Lineæ 19 transversæ fusco-nigræ s. purpurascentes albo interruptæ, alternæ sæpe angustiores. Spira subconica, obtusa."

C. GLAUCUS. *C. emarginatus, basi striatus, spiræ inermis anfractibus convexis.*

C. MONACHUS. *C. gibbus acutus, fusco-cærulescente nebulosus, basi striatus.*

Bonanni was not quoted in the written copy.

C. MINIMUS. *C. cinerascens*, punctis oblongis cinctus.

The original description has been much altered by Linnæus. It ran as follows: "Testa ovata, glauco-cinerea, gibba, striæ transversales plus 30 punctis fuscis oblongis. Spira convexa, alba, maculis fuscis magnis transversis." The cited figure does not even suit these meagre characteristics, which might have been equally applied to *C. glaucus*.

C. RUSTICUS. *C. ovatus*, basi rugoso-scaber, spira conica convexa.

The variety was not noticed, and d'Argenville was not quoted in the original catalogue. "Flavo et glauco" should have been "flavo aut glauco," as written.

C. MERCATOR. *C. ovatus*, albus fasciis reticulatis flavis.

C. BETULINUS. *C. subemarginatus*, basi rugosus, spira planiuscula mucronata.

Seba was not cited.

C. FIGULINUS. *C. emarginatus*, basi rugosa, spira convexa acuta.

An additional synonym, "Rump. t. 31 (error for 33, there being no number 1 in that plate) f. 1," was indicated.

C. EBRÆUS. *C. ovatus* albus fasciis nigris ex maculis transversis.

"Pet. Gaz. t. 99. f. 12." was quoted.

C. STERCUS-MUSCARUM. *C. emarginatus*, basi striatus, spiræ anfractibus canaliculatis.

Of the two species confounded under this designation the *C. arenarius* appeared as a variety in the manuscript. Of the typical form "*Spira lævi*," "Pet. Gaz. t. 75. f. 1," and "Rumph. Mus. t. 33. f. Z," were cited as illustrations; the other synonyms were ascribed to "Var. *a. coronatus spinis obtusis*." The colouring was not mentioned.

C. VARIUS. *C. scabro-coronatus*, elongatus, spira coronata acuta.

C. GRANULATUS. *C. scaber* inermis, striis lævibus.

The original size indicated was "magnitudine coryli."

C. MAGUS. *C. subcylindricus*, fasciis longitudinalibus albo punctatis.

The erroneous figure of d'Argenville was not referred to; and the 32, Q (as in the 'Systema'), not 34, A, of Rumphius was quoted as illustrative. The final remark had been interpolated by Linnæus.

C. STRIATUS. *C. ovato-oblongus* gibbus nebulosus, striis tenuissimis parallelis fuscis.

The "Cæterum testa minus ante convoluta est," is a press addition. "Pet. Gaz. t. 98. f. 9." was correctly cited.

C. TEXTILE. *C. pictus* venis reticulatis luteis, maculis luteis fuscisque.

The intended name (*C. drador*) was an amusing specimen of conchological Latin: it was of course borrowed from d'Argenville's appellation of "*Drap d'or*." "*Columella ad postica quasi replicata est*" was added in the printing; the "luteo" was originally "albo"; the "subconica" was "anfractibus subconicis"; and there was no mention of a variety.

C. AULICUS. *C. pictus* venis reticulatis fasciisque longitudinalibus interruptis fuscis.

"*Columella postice replicata est*," and the objectionable "*obovato-sub*," were not in the copy. No figures were cited in the original catalogue.

C. SPECTRUM. *C. cærulescens, flavo-nebulosus, punctis striisque alboluteis.*

The original description did not comprise those characteristics which are so much at variance with the essentials of the *C. spectrum* of authors. The following passages were omitted: "*gibba, minus arcte convoluta*" (this replaced "*conica*"), "*Columella postice striata et replicata. Intus testa sub-cærulescens*," "*mucrone cingulis granulato*."

C. BULLATUS. *C. flavus, albo nebulosus.*

The account of the variety, and the "*vix tuberculata*," were absent from the manuscript.

C. GEOGRAPHUS. *C. oblongus gibbus coronatus.*

The Rumphian name was the one attached to this species in the written copy.

C. TEREHELLUM. *C. scaber inermis, striis tuberculatis.*

The synonyms attached to the published details were "*Gualt. Test. t. 25. f. L.—Arg. Conch. t. 16. f. P.—Rumph. t. 33. f. EE.*" Now these harmonize with both the heading and the description, and clearly indicate the *C. Nussatella* of the 'Systema'!

The details attached to the published synonyms (which latter belonged to the *C. terebellum* of the 'Systema,' and to which were joined "*Gualt. t. 23. f. O.—Bonan. 3. f. 57.—Pet. Amb. t. 13. f. 24*," ran as follows:

"*Testa cylindracea, glabra, antice angustior, desinens in spiram attenuatam, anfractibus 3. Basis truncata, tenuis. Columella non torta, sed involuta. Color pallidus.*"

CYPREA.

Testa ovata lævis involuta. Apertura linearis, utrinque dentata. Spira occultata intra testam.

C. MAPPA. *C. subturbinata characterisata, macula longitudinali dentata.*

"*Pet. Amb. t. 16. f. 2.*" was an omitted synonym. The terminal remark is an improvement upon the earlier "*Noscitur linea utrinque dentata in superficie scripta.*"

C. ARABICA. *C. subturbinata characterisata, macula longitudinali simpliciter.*

"*Denticulis testaceis*" and the description of the variety were additions by the hand of Linnæus.

C. ARGUS. *C. subturbinata subcylindrica, maculis annularibus.*

The synonyms of Petiver (t. 97. f. 6) and Bonanni (f. 263), quoted in the 'Systema,' were also present in the MS., where "*2. s. 1*" was in the place of "*duabus*." The "*pallidis*" was a misprint for the written "*pallidæ*." The account of the variety was subsequent to the copy.

C. TESTUDINARIA. *C. obtusa cylindrica, extremitatibus depressis.*

"*Pet. Amb. t. 8. f. 7.*" was an unprinted synonym.

C. CARNEOLA. *C. subturbinata pallida, fasciis incarnatis.*

C. TALPA. *C. subturbinata violacea, fasciis pallidis.*

"Pet. Amb. t. 16. f. 1." was an unprinted synonym: "pallide flavescens" was the earlier reading for "testacea." The final remark was not in the copy.

C. AMETHYSTEA. *C. subturbinata, dorso violaceo.*

Rumphius was not originally cited as illustrative.

C. VANELLI. *C. subturbinata, maculata punctis lutescentibus.*

"Obsoletis" was originally in the place of "acutis": the "sæpe lutescentibus" was an addition of the press. *C. Ovum Vanelli* was the intended designation.

C. LOTA. *C. subturbinata alba, denticulis subulatis.*

C. FRAGILIS. *C. subturbinata gibba fragilis, obsolete fasciata.*

Linnaeus himself inserted this heading, with the first three lines of the printed details, in the manuscript copy. Neither the reference, nor the longer account of the variety (evidently a different species) appeared there.

C. CAPUT-SERPENTIS. *C. obtusa triquetro-gibba, postice obtusiuscula.*

"Fusis" was the earlier reading for "confertis."

C. MAURITIANA. *C. obtusa triquetro-gibba, postice depresso-acuta.*

"Pet. Gaz. t. 96. f. 8. ex Insula Mauritii" was added in the manuscript: "fuscus" was the earlier version of "fusco-testaceus."

C. VITELLUS. *C. subturbinata livida, maculis albis.*

The published reference was substituted for "Bonan. 3. f. 254," a more characteristic figure: "maxima ex parte distincta, sed" followed "Spira." "Albida," not "alba," was the tint at first ascribed to the base.

C. MUS. *C. obtusa subovalis gibba cinerea, fascia longitudinali fusca.*

Our author himself inserted the account of this species in the manuscript. Seba was not quoted. "Habitat in Carthagera" was appended to the description.

C. TIGRIS. *C. obtusa ovata, postice obtusa.*

In the synonym of Rumphius, 36 is a misprint for 38: the erroneous reference to the H of Gualtieri was not in the copy, where "Pet. Gaz. t. 96. f. 7" was indicated as illustrative. The printed additions were "aut alba," "fusco-ferrugineis" (in lieu of "fuscis"), and "s. alba, quasi exarata; postice subcylindrica, truncata"; the previous words "Linea, &c." of that sentence were also absent from the original description, but had been inserted by the hand of Linnaeus. "Postice" preceded "planiusculo," and "subviolaceo" followed "nitore."

C. LYNX. *C. oblongo-ovata, linea flavescens, postice acutiuscula.*

No variety was mentioned in the written copy.

C. ISABELLA. *C. obtusa cylindrica, extremitatibus luteis.*

"Pet. Amb. t. 16. f. 16." was cited in the manuscript, where the final remark was wanting.

C. ONYX. *C. umbilicata, subtus fusca.*

Neither of the synonyms was quoted in the copy.

C. SUCCINCTA. *C. umbilicata, labio interiore utraque extremitate rotundato.*

The entire account of this shell (the *C. bicincta* of the MS.) was added to the copy by our author.

C. ZICZAC. *C. umbilicata*, subtus lutea punctis fuscis.

None of the cited figures were referred to in the original, where "interiore" stood in the place of the printed "utroque fusco."

C. HIRUNDO. *C. umbilicata*, supra cærulescente.

"Sparsis", "s. fusca", "necnon macula, &c." were emendations of the press: "postice" preceded "fere marginato" in the original.

C. ASELLUS. *C. umbilicata alba*, fasciis tribus fuscis.

"Pet. Amb. t. 16. f. 18." and "Pet. Gaz. t. 97. f. 11." were cited in the copy as illustrative.

C. CRIBRARIA. *C. umbilicata*, maculis albis.

"Margo" preceded "adscendens" in the copy, in which "livide flavo" was found in place of "luteo": "flavicantibus" was omitted. The intended name was *C. Argiolus*.

C. ERRONES. *C. umbilicata*, macula testacea æquali.

Erratica was the original specific appellation.

C. MONETA. *C. marginata-nodosa*.

"Pet. Gaz. t. 97. f. 8." and "Pet. Amb. t. 16. f. 8." were omitted in printing; "subflavescente" followed "convexo"; "subtus planiuscula" and "incisis" were absent. In place of the final remark (added, however, by the hand of our author), there originally stood "Noscitur tuberibus quinque elevatis."

C. ANNULUS. *C. marginata annulo flavo*.

The "s. rotundata" was added in printing.

C. EROSA. *C. marginata flava albo-punctata*.

"Undique aspersa" and "Macula fusca notat medium utriusquelateris" are the printed emendations.

C. HELVOLA. *C. marginata*, postice crenata, subtus flava immaculata, supra albo punctulata.

The final remark was unwritten, and the size not mentioned: "marginis gibbi" was "margine exteriore gibbo", and "subcrenati" was "latere subcrenato."

C. STOLIDA. *C. marginata variegata cinereo testaceoque*.

"Quinque" and "adspersis" were not in the original.

C. OCELLATA. *C. marginata lutea*, ocellis nigris.

C. FLAVEOLA. *C. marginata fulva*, albo punctata.

C. PORARIA. *C. marginata subviolacea*, albo punctata.

C. PEDICULUS. *C. transversim sulcata*.

"List. 168. t. 3. f. 17." and "Barr. t. 1326. f. 28." were cited in addition to the printed synonyms. The last four words of the description were not in the copy.

C. NUCLEUS. *C. sulcata punctata tuberculis*, rostrata.

"Pet. Amb. t. 16. f. 11." was cited as illustrative.

C. STAPHYLÆA. *C. punctis elevatis sine striis*, subrostrata.

The printed "minus" has been substituted for the earlier "vix";

"lutea" for "flava"; and "totam basin" for "maximam partem baseos."

C. GLOBULUS. C. rostrata lævis.

The printed additions were "alba s.", "extremitate utraque" (in place of "postice"), "Superficies punctis vix manifestis notata", and "excurrentes in strias".

BULLA.

Testa subrotunda, inflata, lævis. Apertura oblonga, non utrinque dentata. Spira obsoleta. Columella obliqua.

The *Murex ficus* and *rapa* of the printed edition were originally located in this genus, from which *Auris Midæ*, *Auris Judæ*, and *achatina* were excluded: the two former were placed in *Morion*, the last in *Buccinum*.

B. OVUM. B. birostris, labio dentato.

"Arg. t. 21. f. A." "Pet. Gaz. t. 94. f. 7." "Pet. Amb. t. 8. f. 6." were additional references in the written copy: "magnitudine ovi gallinacei", "apice et basi producta", were emendations during the printing. The "dilatata" was originally modified by a "parum."

B. VOLVA. B. birostris, rostris elongatis striatis.

"List. t. 711. f. 63" had been added to the copy by the hand of Linnaeus. The mode of reference (not, as in the earlier writings, by sections and chapters) evinces that this addition was, in all probability, subsequent to the publication of the work.

B. VERRUCOSA. B. angulata, aucta utrinque puncto osseo.

The correct synonyms of "Arg. t. 21. f. M." and "Pet. Gaz. t. 97. f. 22." were found in the manuscript: the printed emendations were, "magnitudine ovi passerini", "uti antierius", and "granis duobus" for the earlier "punctis."

B. GIBBOSA. B. angulata, cingulo elevato.

"Bonan. 249", "List. t. 711. f. 64", "Pet. Gaz. t. 15. f. 5", were cited in the copy: "præcedentis magnitudine", "solidiorque", with the modification of "cylindrica" by a preceding "sub", were press emendations.

B. NAUCUM. B. rotundata pellucida.

The size was not at first mentioned.

B. AMPULLA. B. rotundata opaca.

The printed "nulla" replaced the earlier "descendens, nuda", and "pallido-testacea" the written "albida." The "antice, nullus vero postice" was an emendation of the press.

B. PHYSIS. B. spira obtusa, lineis crispata.

"Sæpe", "hiansque", "tenue", and the name, are not to be found in the written copy: "apicem" was the reading for the printed "ventrem, adnatum."

B. AMPLUSTRE. B. spira elevata, fasciis incarnatis.

B. PALLIDA. B. spira elevata acuta, corpore cylindrico.

So very many changes has this puzzling species experienced in the works of our author, that it has been thought advisable to transcribe the written description from the manuscript copy:—

Testa ovato-cylindrica, glabra. Spira convexo-conica, mucronata. Columella multum torta. Color lividus, longitudinaliter griseo undulatus.

This evidently was a very different shell from the four-plaited, pale pink, and often variegated specimen described in the printed copy. The description of the outer lip, the name, and the terms "solida", "lævigata, obsoletior" were, likewise, additions of the press.

B. CANALICULATA. *B. cylindrica lævis, spiræ anfractibus canaliculatis.*

The entire account of this species was added to the manuscript in the Linnean handwriting.

B. ACHATINA. *Buc. glabrum, apertura integra.*

"Colum. Aphr. 18. t. 16" was the omitted synonym: "vel inæqualiter ovata" and the entire account of the base (merely described as "vix manifeste emarginata") were the printed additions.

B. AURIS-MIDÆ. *Morion ovali-oblongum, spira rugosa, labio interiore bidentato.*

Figure 122 of Klein's seventh plate was correctly quoted as illustrative: "crudæ" preceded "niger."

B. AURIS-JUDÆ. *Morion oblongus, spira lævi, labio interiore tridentato.*

B. SOLIDULA. *B. ovata opaca striata, spira elevata.*

I do not doubt, from the "ovata", that *Tornatella flammea* was the shell originally here intended; for the inharmonious account of the inner lip (as well as of the outer one) was not found in the manuscript,—from which, too, the erroneous reference to Bonanni was at first absent. The "acutiuscula" was "obtusiuscula": the "postice rotundata, antice acuta" was an improvement upon the earlier "pone gibba."

B. LIVIDA. *B. spira elevata obtusa, corpore cylindrico.*

This heading makes no mention of the columellar plication of the shell so named in the 'Systema,' and confirms my surmise of their distinctiveness. The name *livida* was not originally attached to the description, but had been added (together with "obsoletis") by Linnæus, from a mistaken identification.

There has evidently been some error in the comparison with *Voluta Caffra*. I suspect that *Conus bullatus* was meant, as the contrasting characters answer admirably. "Differt a *B. pallida et livida*, quod testa solida—anfractus spiræ canaliculati". This passage shows that "fragilis et spiræ anfractus obtusæ" referred to *livida*, not to *Caffra*.

VOLUTA.

Testa oblonga, subconvexa, basi emarginata, replicata in canalem rectum. Columella plicata oblique. Labio integro.

The genus appears to comprehend precisely the same members as in the published edition. They were arranged in sections exactly corresponding with the Lamarckian genera of *Oliva*, *Voluta*, *Mitra*, and *Marginella*.

V. PORPHYRIA. *V. spira basi oblitterata, labio medio retuso.*

Linnaeus spoils his excellent earlier description by his attempted emendations. The interpolated "*Faux sæpius rufescens*" (misprinted *virescens*), and the reference to Gualtieri's figure O. (*O. erythrostoma*), formed no part of the original version.

The "*Varietas fere sola est V. Olivæ*" was an afterthought.

V. OLIVÆ. *V. spiræ basi reflexa*.

The synonyms were thus distributed. To var. *a*, Rumph. t. 39. f. 2, and Gualt. t. 23. f. B; to var. *g*, Rumph. t. 39. f. 3; to var. *e*, Arg. t. 16. f. R; to var. *d* ("*Cæsius atro-undatus*," not "*Fusco undulatus*" as printed), Rumph. t. 39. f. 4. The expressions "*ponderosa*" and "*magis sulcatum*" were not in the original.

V. ISPIDULA. *V. spira adscendente, margine unico*.

"Pet. Gaz. t. 59. f. 8," cited in the 'Systema,' was also written in the manuscript: not so the "*Varietas forte præcedentis V. Olivæ*." None of the drawings exhibit the produced spire, which must have resembled that of *O. jaspidea*. The earlier name was *ispida*.

V. GLABELLA. *V. ovata lævis, labii margine reflexo, basi rotundata*.

The reference to Gualtieri (a doubtful figure) was not originally inserted. The intended name was *V. polita*.

V. CAFFRA. *V. fusiformis lævis*.

The absurdity of asserting, in relation to this and the next species, that each resembled the other, but was larger, arose from the circumstance that when our author, in revising the labours of his amanuensis, added "*sed major*," he omitted to erase it from the following species.

V. VULPECULA. *V. fusiformis angulata inermis, transversim striata*.

Of the ample details the first two paragraphs only were found in the manuscript. The proposed name was *V. picta*.

V. PLICARIA. *V. fusiformis, angulis antice subspinosis*.

The intended appellation *angulata* was changed from an erroneous impression of the identity of the species with the *Turricula plicata* of Rumphius. "*Mucronatis*" and "*albidus*" were emendations. "Bonan. 8. f. 65" was referred to, as in the 'Systema'.

V. PERTUSA. *V. fusiformis, labro denticulato, striata punctis pertusis*.

V. denticulata was the name originally proposed for this *Mitre*.

V. MITRA. *V. fusiformis lævis, labro denticulato*.

The final paragraph was not in the manuscript, where "Bonan. 3. t. 119, 120", and "Klein, 36. Mitra episcopi", the former cited in the 'Systema', the latter a mere name, were quoted as illustrative.

V. MUSICA. *V. spinis obtusiusculis, columella plicis 8*.

The reference to the letters X. and Y. of Gualtieri (neither of which are illustrative) stood not thus in the original: the characteristic Z. of that work was the figure really cited. The printed edition has been enlarged by an "ob" before "ovato" the addition of "solida", and the description of the lips.

V. VESPERTILIO. *V. spinis acutis, columella plicis 4*.

The only printed additions are "ob" before "ovato", "s. glauca", and "fuscis lineis" in place of the "saturatus."

V. *ÆTHIOPICA*. *V. spinis fornicatis cingentibus apicem papillarem.*

"Habitat in mari Pacifico", "Pet. Amb. t. 7. f. 5" (copied from Rumphius, t. 31. f. B.), and "Bonan. t. 3 f. 1" (cited in the 'Systema') were the unprinted additions.

V. *CYMBIUM*. The entire account of this shell was in the handwriting of Linnæus, and inserted at a later period than the mass of species. The decided reference to Gualtieri was not in the manuscript.

V. *OLLA* was not mentioned in the written catalogue.

In addition to the species published in the 'Museum,' the following were also characterized in the manuscript:—

V. *FABA*. *V. ovata, antice subplicata, labii exterioris margine reflexo, basi rotundata.*

Bonan. 3. f. 49.

Testa magnitudine vix fabæ, ovalis, lævis, antice subplicata, livida, punctis fuscis aspersa. Spira testæ $\frac{1}{2}$ brevior, subplicata. Labium exterius reflexum, basi rotundatum integrum.

This was evidently the shell so designated in the 'Systema.'

V. *GRANULATA*. *V. fusiformis, sulcis longitudinalibus, striisque transversalibus.*

Rumph. Mus. t. 29. f. V.

Arg. Conch. t. 12. f. V.

Testa facie antecedentis, sed sulci et striæ contrariæ, fusiformis, sulcis longitudinalibus elevatis obtusis, striis transversalibus exaratis. Color cinereus, fasciis linearibus 2 rubris ex punctis. Spira longitudine ventris. Apertura præcedentis.

This was the *V. sanguisuga* of the 'Systema.'

The preceding species referred to was

V. *LIMA*. *V. fusiformis, sulcis transversis, striisque longitudinalibus.*

Rumph. Mus. t. 28. f. T.

Testa fusiformis, scabriuscula, striis longitudinalibus secundum testam, et sulcis secundum anfractus adscendentibus margine acutiusculis. Color albidus sulcis elevatis rubris—albidus sulcis elevatis flavis albo interruptis. Spira longitudine ventris. Apertura oblonga, intus alba. Basis acuta, emarginata. Labium exterius integrum; interius nullum. Columella dentibus 4 obliquis.

These features fairly enough suit the *Mitra filosa*, generally, and with reason, supposed to be the *V. filaris* of the 'Mantissa.' The cited figure however, seems *M. gracilis* of Reeve.

BUCCINUM. '

The species which compose this group in the 'Museum' were originally separated under many generic designations.

1. *BUCCINUM*. Testa ovata, ventricosa. Apertura integra, semilunaris, superne extrorsum, postice introrsum.

2. *CASSIDA*. Testa ovata, gibba. Cauda reflexa oblique. Apertura longitudinalis, obliqua.

3. *LYRA*. Testa ovata, ventricosa. Apertura ovata, patens, pone submarginata. Labium interius nullum. Columella compressa, nitida.

4. *TURRICULA*. (No definition: evidently intended for all the turreted shells.)

5. *MORION*. Testa oblonga, inermis. Apertura oblonga, labio interiore reflexo unidentato.

In the first were located the *Dolia*, and *B. echinophorum*; in the second the *Cassides*, with *B. papillosum* and *arcularia*; in the third the *Harpæ* and *Purpuræ*; in the fourth the *Terebræ*; in the fifth *B. glans*, *spiratum*, *glabratum*.

B. undosum was located in *Murex*.

B. PERDIX. *B. umbilicatum* subsulcatum, basi recta.

The proposed name was *B. pennatum*, adopted from Rumphius: "lunari-patula" was not in the manuscript.

B. POMUM. *B. exumbilicatum*, labio utroque dentato.

"Barr. Ic. t. 1325, f. 12" (cited in the 'Systema'), and "Klein, 95. Semicassis, striata, costosa", were the additional synonyms of the manuscript: "s. sulcata", "nullum, interne", "at vero in adultioribus accrescit planum album", were subsequent emendations.

B. DOLIUM. *B. emarginatum* subsulcatum rugosum, labio exteriori reflexo dentato.

The *Dolium fimbriatum*, or, as Deshayes prefers it, *D. Minjac* (the Malay name was *Bia Minjac* in Rumphius, who preceded Adanson), was assuredly the shell described in the 'Museum', as the recorded dentation of the outer lip clearly manifests. An excellent figure of it in Petiver ("Gaz. t. 99. f. 11") was cited in the original copy, where the drawing of Gualtieri was not referred to.

B. ECHINOPHORUM. *B.* (changed to *Cassida*) *tuberibus* ("quaterna serie" interpolated) *nodosum*.

The reference to Rumphius was correctly written *l*, not *I*, in the original, where "albido-flavescens" was the indicated colouring. The printed emendations were "quadruplici s. quintuplici", instead of "triplici", and the entire account of the aperture, which at first ran simply as follows, "Labium exterius crassius, margine tenuiore, interne subrugosum, obsolete dentatum."

B. TUBEROSUM. *B. tuberibus* gemina serie *nodosum*.

The entire published account of this species had been interpolated by Linnæus in the written copy, with the exception of the "color pallidus." The "nodis anterioribus" was a misprint for "nodis acutioribus."

Gualtieri's admirable figure of the *Cassis tuberosa* of authors was not, however, cited, which confirms my statement that the species of the 'Museum' was not the *Cassis* usually so designated.

B. CORNUTUM. *Cas. acuminibus antice cingentibus, superficie reticulata.*

The I in the reference to Rumphius was a misprint for the written 1 : "maculata" was originally "maculis griseis."

B. RUFUM. *Cas. nodis sparsis.*

"Pyri" was a misprint for the written "pugni". Neither the "maculis fuscis" nor the "Variat tota albo colore" were originally present. The Rumphian name *rubra* was the one written.

B. FLAMMEUM. *Cas. longitudinaliter striata, antice subnodosa.*

To the solitary synonym our author had added "List. t. 1004. f. 69" and "Sloan. Hist. 2. p. 242. n. 2". The final remark was not in the copy.

B. TESTICULUS. *Cas. lævis, striis longitudinalibus, sulcis transversalibus.*

"Vix ullus" was at first "nullus": "læve" was not present.

B. DECUSSATUM. *Cas. lævis, striis decussatis, labio exteriore dentato.*
"Bonan. Clas. 3. t. 157" was an additional synonym.

B. AREOLA. *Cas. glabra, spira papillosa.*

The erroneous references to Gualtieri, and to the figure 2 of Rumphius, were not present in the original, nor was there any allusion made to the sculpture of the inner lip.

B. ERINACEUS. *Cas. subsulcata, antice nodosa, labio edentulo, postice extrorsum denticulato.*

The entire account of this *Cassis* was interpolated by Linnæus in the pages of his amanuensis.

B. GLAUCUM. *Cas. glabra, antice muricata, labio dentato, postice extrorsum denticulato.*

The superfluous A in the reference to Gualtieri was a misprint: "inferne" was "interne": the "acuminata" and "marginatum" were emendations.

B. VIBEX. *Cas. glabra, labio edentulo, postice extrorsum denticulato.*
The figures 8 and 9 of Rumphius were not cited.

B. PAPILLOSUM. *Cas. papillis decussatis, labio tenui, extus denticulato, fauce glabra.*

"Rectum" followed "exterius" in the written copy, wherein "s. albidus" and "antice sinu excavata" were not to be found.

B. GLANS. *Morion labio exteriore denticulato, interiore bidentato.*

"Labium exterius margine postico denticulato" was omitted in printing.

B. ARCULARIA. *Cas. longitudinaliter sulcata, labio exteriore tenui, interiore maximo.*

B. COSTATUM. *Lyra costis longitudinalibus, antice prominulis, alternis obsoletis.*

This diagnosis but ill suits the *Many-ridged Harp*, which, of late, has been considered identical.

B. HARPA. *Lyra costis longitudinalibus antice mucronatis.*

The shell is described in the MS. as "striata subtilissime longitudinaliter", and "Pet. Amb. t. 2. f. 2", "Pet. Gaz. t. 48. f. 13" (the latter quoted also in the 'Systema') are there substituted for the reference to Gualtieri.

The printed additions are considerable; to wit, "costæ vero striis transversis", "anfractibus costis mucronatis", "denticulatum."

B. PERSICUM. *Lyra læviuscula*, labii margine crenulato.

The erroneous citation of Grew (t. 9. f. 5, 6) in the 'Systema' had been adopted in the manuscript.

B. PATULUM. *Lyra muricata* spinis obtusis.

Neither the erroneous reference to Gualtieri, plate 51. f. A (which was designed for *Purpura hæmastoma*), nor the "color interne rufescens", is to be found in the manuscript.

B. SMARAGDULUS. *Lyra glaberrima*, columella denticulata.

Neither the erroneous reference to d'Argenville, nor the specific name derived from his figure, is to be found in the MS. The proposed appellation was *L. vitrea*. "Simillima Cassid. lapillo, sed glabra, et columella crenata" is the unprinted remark.

B. SPIRATUM. *Morion umbilicatus*, anfractibus distinctis canaliculo.

The specified colouring was "alba, maculis longitudinalibus fuscis": "pone bifidum" followed "integrum." The intended name was *M. canaliculatus*.

B. GLABRATUM. *Morion umbilico* descendente flexuoso.

d'Arg. Conch. t. 12. f. G.

"Testa oblonga, acuminata, obtusiuscula, glaberrima, anfractibus confluentibus, Neritarum maximarum pondere. Color albo-flavescens, nitidus. Apertura obliqua, profunde emarginata. Labium exterius integerrimum. Labium interius antice reflexum adnatum, dein solutum brevius flexuosum, descendens ad basin. Sulcus profundus distinguit basin testæ. Umbilicus pone labium interius descendens ad basin sulco."

B. VIRGINEUM. I can find no account of this shell in the written copy.

B. UNDOSUM. The nearest approach to this species seems the variety B. of the *Murex succinctus* (the shell so named in the 'Mantissa').

M. lævis, sulcis transversis lævibus, angulo marginali.

d'Arg. Conch. t. 12. f. N. Bon. 3. f. 47.

Testa ovata, absque tuberculis, magnitudine nucis, exarata sulcis transversis pallidis, eminentibus vero lineis luteis. Spira obtusa, anfractibus rotundatis. Cauda teretiuscula. Apertura ovata, margine crasso, nec alia costa laterali crassa.

Var. B. Rugis s. angulis oblitteratis 5 longitudinalibus.

B. MACULATUM. *Turricula elongata*, anfractibus lævibus integerrimis.

The I. of Gualtieri, and the reference to d'Argenville, were printed emendations.

B. CRENULATUM. *Turric. elongata*, anfractibus margine crenatis.

The reference to Gualtieri was an emendation.

B. STRIGILATUM. *Turric. elongata*, oblique striata.

B. DUPLICATUM. *Turric. elongata* emarginata, anfractibus bipartitis striatis.

STROMBUS.

This genus, rendered more natural by the omission of *S. lividus* and *ater* (assigned to *Turricula*), appeared under the designation of HARPAGO with the following definition :—

Testa depressa, nodosa. Apertura longitudinalis. Labium antice dilatatum ultra basin.

The *Strombi* of the manuscript were the young of this genus (erased by Linnæus) and certain Lamarckian *Fusi*, *Pyrulæ*, and *Fasciolarie*.

S. CHIRAGRA. *Har. labii spinis lævibus 6, extimis recurvis, fauce striata.*

"Bar. Icon. 327. f. I." was an additional synonym.

S. SCORPIUS. *Har. labii spinis nodosis 7, fauce striata.*

The published account was enlarged by the following passages, which are not to be found in the written copy: "crenulato cincta", "lato, brevi", "s. incarnata", "s. testaceo-nebulosus". "Distinctum" was originally "obscurum", and "repandus, inflexus" was "denticulatus."

S. LAMBIS. *Har. labii spinis lævibus 7, fauce lævi.*

"Bar. Icon. t. 1326. f. 7" was the synonym omitted in printing. The name was borrowed from d'Argenville.

S. MILLEPEDA. *Har. labii spinis lævibus 10.*

"Anteriora" was "posteriora" in the manuscript.

S. LENTIGINOSUS. *Har. labio inermi integro rotundato, angulis pluribus nodosis.*

The "aut marginatum" was "fragile, diaphanum", so that a young shell appears to have furnished the materials for description.

S. GALLUS. *Har. labio inermi mucronato, cingulo dorsali spinoso.*

S. AURIS-DIANÆ. *Har. labio inermi muricato, cauda recurva, lobo incurvato.*

The "32, f. H." was a misprint for the written "17. f. O." The printed additions are "usque" and "Color testaceo et albedo nebulosus."

S. PUGILIS. *Har. labio inermi obtuso, spira spinosa distincta, basi emarginata.*

"Nitida", and "sed spira albida", were not found in the original.

S. LUHUANUS. *Har. labio obtuso, antice posticeque emarginata.*

Few of the details were present in the original copy, but appear to have been added, to discriminate the species from the allied *gibberulus*. "Spira obtusa brevis" was added by the hand of Linnæus; "sæpe subplicati", "postice lobo obsoleto instructum", "intus", "Columella nigricans", "Cauda nulla, sed postice emarginata", were all absent from the MS.

S. GIBBERULUS. *Har. labio inermi, dorso lævi, spira repanda.*

The printed additions are "subtus planiuscula", "læves", "fuscum", and the final remark.

S. LATISSIMUS. *Har. labio inermi rotundato, spira subnodosa brevior, dorso lævi.*

S. EPIDROMIS. *Har.* labio inermi dilatato, dorso lævi, spira subnodosa.

The *S. epidromis*, as it originally stood in the manuscript, was a recognizable species, and precisely identical with the shell so named in the 'Systema'; for the erroneous reference to Gualtieri was not present, neither was "carinato," nor any of the discordant details from "interius" to the termination. As the printed description now stands, it would suit *S. emarginatus* or *succinctus*, at the least, equally well. I doubt not our author, when correcting the press, forgot his own species, and added the partial essentials of one species to those of another.

S. CANARIUM. *Har.* labio inermi dilatato, dorso spiraque lævibus.

The erroneous reference to plate 37 of Rumphius was not present in the written copy, which contains the additional synonyms of "Pet. Gaz. t. 98. f. 11", and "Klein, t. 4. f. 73": the latter was not there originally. The early description has been improved, in the press, by the addition of "obovata", "Faux lævis, alba", and "longitudinaliter subundulatus."

S. VITTATUS. *Har.* labiis inermibus, spiræ anfractibus vitta interstinctis.

S. URCEUS. *Har.* labiis inermibus striatis, dorso nodoso.

The erroneous reference to Gualtieri was not present in the original, but in place of it the 37. W. of Rumphius (*S. mutabilis*): "Spira testa brevior, plicato-subnodosa" was, likewise, absent. "Klein, 49, urceus fimbriatus" (a name for Rumph. t. 37. f. F & W) was interpolated by our author.

S. ATER. *Turricula* labiata.

Neither the reference to Rumphius, nor the "et postice emarginatum" were found in the original. This confirms my expressed belief that the Museum species (to which no name was at first attached) was distinct from that of the 'Systema.'

S. LIVIDUS. *Turric.* labiata, anfractibus serie subspinoso.

This was located in a section of *Turricula* distinguished as having the outer lip dilated and rounded.

Besides the above, the following unprinted details were found in the manuscript :—

The *Strombus gigas* was described at length under the appellation of *Harpago gigas*.

Har. labio inermi rotundato, dorso spiraque subulato-spinosis.

Gualt. t. 34. f. A. Bar. Icon. 1727. f. 7.

Testa gibba, maxima, magnitudine capitis. Cauda obtusa. Spira spinis patentibus, subulatis, validis. Anfractus desinens in dorso spina. Series in dorso spinarum maximarum ferme conicarum. Labium dilatatum, rotundatum, spira longius, vix adnatum spiræ. Faux glabra, nitida, incarnata. Color pallidus.

The *Strombus dentatus*? was also defined (without a specific appellation) by the following characters :—

Har. labio dentato, testa lævis, plicato-nodosa.

Testa simillima reliquis, longitudine articuli digiti, lævis, flavescens, sub-

plicata, plicis antice acuminatis nodis. Spira acutiuscula, similiter plicata, nodosa. Labium exterius minus dilatatum, postice margine dentatum et interne fuscum, striatum. Labium internum crassum, integrum, læve.

The *Strombus palustris*, although not published until the twelfth edition of the 'Systema,' had been already defined in the 'Museum' as *Turricula cornea*.

Tur. decussatim rugosa, labio dilatato.

Rumph. 101. t. 30. f. Q. *Strombus palustris*.

Testa crassa, rudis, pyramidalis, cornea aut plumbea, anfractibus 12 et ultra, secundum spiras transversim aliquot striis exarata, longitudinaliter subplicata, adeoque sine spinis rugosissima. Labium dilatatum, rotundatum, concavum, edentulum.

MUREX.

The definition of this genus ran as follows :—

Testa subovata, spinosa. Apertura coarctata, ovata, desinens in canalem tubuloso-conniventem.

This was evidently designed for the *Murices* proper. The other species of the 'Museum' were distributed in the groups of *Cassis*, *Turricula*, *Bulla*, and *Strombus*. The last was defined as follows; "Testa obverse conica, nodosa, labium exterius angulum transversalem superne formans; interius nullum. Columella incurva. Cauda integra."

M. HAUSTELLUM. *M.* caudatus, subinermis, nodosus.

"Suturis" was originally "costis". The printed emendations are "gibbis, adglutinatis", "costati et nodosi", "subtus rima longitudinali clausa", "margine", and the final remark.

M. TRIBULUS. *M.* caudatus, spinis subulatis trifariis.

"Olear. Mus. t. 39. f. 1" was cited in the transcript, to which Linnæus had added "Bonan. 269" and "List. t. 902. f. 22", all which synonyms are present in the 'Systema.' The printed additions are "suturis 3 longitudinalibus, adglutinatis, incrassatis", "secundum suturas: superficies transversim striis elevatis distinctis", "recta".

M. CORNUTUS. *M.* caudatus, spinis subulatis serie gemina.

The s. in the reference to Rumphius was a misprint for the written 5: "Pet. Gaz. t. 68. f. 12" (as in the 'Systema') was present in the copy. The expressions "striata", "conicæ", "obliquo situ", and the final remark, are the printed additions.

M. TRUNCULUS. *M.* subcaudatus, spinis simplici serie.

The description of the tail and account of the variety were not originally present: "suturis" was, at first, "plicis", and "adglutinatis" was "antrorsum adnatis".

M. RAMOSUS. *M.* dædaleus triangularis, spira longitudine ventris.

Had the original manuscript been printed, the multitude of species confused under this appellation would have been somewhat lessened. For the cited figures of *M. inflatus* (Rumph. t. 26. f. A, and Gualt. t. 38. f. A), with that of another short-spined *Murex* (Arg. t. 19. f. C), were separated from

the rest, and quoted for a *M. unguis-odor*, the brief definition of which was "*M. dædaleus triangularis, spira ventre brevior.*"

The published details, and the drawings of the longer-spined and more slender-bodied *Murices* (Rumph. t. 26. f. 1; d'Arg. t. 19. f. E, H.), appeared as *M. lichenoides*.

I consider, then, that in that event the *M. adustus* (Arg. t. 19. f. H.), which would tolerably suit the definition, would have been considered the typical form, and *M. axicornis* (Rumph. t. 26. f. 1, and d'Arg. t. 19. f. E.), the variety γ .

M. SCORPIO. *M. dædaleus quadrangularis, spira subcapitata.*

The ill-judged final remark was not in the copy.

M. SAXATILIS. *M. dædaleus quinquangularis, spira contigua.*

The idea of this being a mere variety was not expressed in the original.

M. RANA. *M. angulatus subdepressus, costis lateralibus.*

The R. of d'Argenville was properly referred to the variety B. The "alba", "sulcis transversis", and "Dorsum anfractum simplici cingulo aculeato" were not in the copy.

M. LAMPAS. *M. angulatus tuberculis nodosis, cauda flexuosa, labio interiore lævi.*

The earlier reading of "una alterave ruga" was "uno alterove denticulo."

M. FEMORALE. *M. angulato-triqueter: angulis antrorsum acuminatis.*

The intended name was *M. triqueter*. Grew's engravings (f. 7, 8) of the species were correctly cited, and the erroneous reference to Rumphius was not inserted. The printed additions were unimportant—"exarata", "repando", "sub" before "edentula", and "levissime".

M. LOTORIUM. *M. angulatus, tuberculis conicis, cauda flexuosa, labio interno rugoso.*

"Subter" was a misprint for the written "inter": the "ut in proximis" was a printed addition.

M. RUBECULA. *M. angulatus, sulcis moniliformibus, costis lateralibus, dorsalique.*

"Gualt. t. 49. f. I" was rightly cited as illustrative: "ex" preceded "lineis".

M. RETICULARIS. *Cas. inæqualis gibba reticulata, cauda elongata.*

The erroneous reference to Rumphius was not present in the manuscript. As corroborative of my expressed belief in the identity of the species described in the 'Museum' with the *Triton! mulus*, it may be observed, that our author has wholly separated this and the allied *anus* from the true *Tritons* and *Ranellæ*, and that the original heading corresponds accurately with the peculiar characteristics.

M. ANUS. *Cas. inæqualis, gibba nodosa, labris rugosis.*

"Pet. Gaz. t. 74. f. 9" and "Pet. Amb. t. 6. f. 4" were the unprinted synonyms. The "rugis reticulato-intertextis", "irregularis", and "patens" were emendations.

M. RICINUS. *M. ecaudatus, ore utrinque dentato.*

"Æqualibus, ad labium majoribus" was not in the copy.

M. CAPITELLUM. *M. ecaudatus ovatus, columella rugosa, labio edentulo, superficie inermi rugosa.*

"Alba" followed "edentula", and "Umbilicus ad basin" terminated the description in the original: the word "striis" was a subsequent introduction.

M. TURBINELLUS. *M. ecaudatus, turbinatus, columella dentata, spinis explicatis.*

The printed additions are "anteriores", "nodulosa", "alba", "Cauda vix ulla", and "Variat colore albo spira longiore".

M. CERAMICUS. *M. ecaudatus, utrinque acuminatus, columella dentata, spinis conicis.*

"Rumph. t. 49. f. L." was an unpublished synonym.

M. NODUS. *M. ecaudatus ovatus, labio denticulato.*

As "Gualt. t. 28. f. R." was quoted, and "aut nigris, conicis, obtusiusculis" (a character which probably belonged to some distinct species erroneously supposed to be a variety) was not inserted in the manuscript, I feel convinced that the *Purpura hystrix* of authors was the species designed in the 'Museum Ulricæ.'

M. HYSTRIX. *M. ecaudatus edentulus, fauce lævi.*

M. MANCINELLA. *M. ecaudatus, edentulus fauce striata.*

This original heading, and the absence of the erroneous synonym from the MS., confirm the received opinion of the identity of the Museum species (not that of the 'Systema') with *Purpura mancinella*.

M. HIPPOCASTANUM. *M. ecaudatus edentulus, fauce edentula integra, spinis serie triplici.*

Gualtieri's erroneously cited figure was not indicated in the manuscript. No specific name had been originally attached to the description.

M. MELONGENA. *M. ecaudatus edentulus fauce patula lævi, spinis serie duplici.*

"Bonan. 3. f. 186" had been added to the synonymy by our author. The details were less copious than in the published edition, "apice solo acuminatus" being the meagre substitute for the entire description from "Spira" to the end.

M. FICUS. *Bul. caudata, striis reticulatis, spira obtusa.*

"Pet. Amb. t. 6. f. 9" was an omitted synonym. The shell described in the 'Museum' was assuredly not the *ficus* of most writers.

M. RAPA. *Bul. caudata, striis longitudinalibus, spira acuta.*

M. FUSUS. *Turric. caudata lævis, labio dentato.*

"Bonan. f. 121" and the name had been added to the MS. by Linnæus.

M. BABYLONIUS. *Turric. caudata, transversim angulo sulcata, labio marginali versus basim sinu exciso.*

M. COLUS. *Turric. caudata striata, labio exteriori crenato.*

The printed emendations were "longa" and "s. angulati." The name was added by Linnæus. The following unnamed *Turricula* succeeded the species in the manuscript copy:—

T. caudata striata, longitudinaliter sulcata.

Testa parva, striis plurimis secundum anfractus. Anfractus scabri, sulcis longitudinalibus 15. Color anfractuum superne griseus inferne pallidus. Apertura ovata. Rostrum baseos rectum, testæ dimidio brevius. Labium tantum exterius integrum. An filia præcedentis?

M. MORIO. *Strom.* spira subnodosa, labio exteriore intus rugoso.

The synonymy, as might be expected (for Seba was unknown to Linnæus when the descriptions were written), was not in the original.

M. COCHLIDIUM. *Strom.* spira pyramidata, anfractibus planis.

The reference to Seba, the name, and the "Cauda subulata, longitudine testæ" were not present.

M. CANALICULATUS. *Strom.* spira subconvexa, anfractibus distantibus.

The "Anfractus distincti canaliculo per omnes spiras," the name, and the reference to Seba, were the printed additions. "Habitat in Canada. Kalm." was appended.

M. ARUANUS. *Strom.* incurvus spinosus ventricosus, angulo obsoleto.

The objectionable name (for assuredly the *Buccinum Aruanum* of Rumphius suits not "spinosus") was not present in the original, but had subsequently been added by our author, who seems to have erased the original "Habitat in Canada. Kalm." I doubt not that *Pyrula carica* was intended.

M. PERVERSUS. *Strom.* inversus.

The wretched engraving of Gualtieri was not cited.

M. TRITONIS. *Cas.* pyramidalis lævis, columella dentata.

"Bonan. 3. f. 188" stood in the place of Seba. The printed additions were "plerisque", "et suturis variis alternis crassis", and the specific epithet. "Genus difficile eruitur" was written after the description, and the following note erased:—"Ad genus retuli ob labium interius adnatum in quibusdam latius, ob suturas verrucosas, ob caudam canaliculatam parum elevatam, ob labium postice dentatum, quæ omnia affinitatem arguunt."

The *Triton nodiferus* was probably designed by the following description, which succeeded that of *M. Tritonis*:—

Cas. (corrected by Linnæus to *Murex*) *Neptuni*. *C.* pyramidalis nodosa, columella dentata.

Testa maxime facie statura et colore præcedentis. Anfractuum angulus summus nodis prominentibus, unde et spira nodosa evadit, quod non in præcedente. Apertura præcedentis. Labium interius magis dilatatum, maximeque planum. Columella non dentata. Habitat Constantinopoli. Edw. Carleson.

M. TRAPEZIUM. *Strom.* spira nodosa, labio denticulato, columella rugosa.

M. ALUCO. *Turric.* recurvirostra, spinosa, serie simplici.

Gualtieri was not cited, and the reference was to "N. Strombus tuberosus" (*Cerithium aluco*), not O. (*C. nodulosum*) of Rumphius. The inner lip was described as "non adnatum, sed prominens": "s. fuscis", and "Variat cauda recta, &c.", were not in the original.

Besides the published species, the following had been written, but omitted in printing:—

TURRICULA ALBA. *T. alba recurvirostra*, anfractibus margine crenulatis.

Bon. 3. t. 84. Rumph. t. 30. f. K. Pet. Gaz. t. 56. f. 4. d'Arg. Conch. t. 14. f. P. Gualt. Test. t. 57. f. D.

Testa lævis. Anfractus circiter 15, margine subcrenati. Color albus, sæpius saturatior ad marginem anfractuum. Apertura ovata, rostro canaliculato, recurvo. Labium interius adnatum, dente unico obsoleto.

This was evidently identical, from its synonymy, with the *M. vertagus* of the 'Systema.'

TURRICULA SENTICOSA. *T. reflexo-emarginata*, costis reticulatis. d'Arg. Conch. t. 12. f. O.

Testa gibba, costis sæpius 12 perpendiculari-obliquis, intertextis striis lamellosis transversis ad anastomosases muricatis, unde admodum scabra evadit. Anfractus ventricosi, sæpius x. Color griseus. Apertura ovata, interne striata, emarginata, parum reflexa.

Evidently this was identical with the *M. senticosus* of the 'Systema.'

M. OLEAGINEUS. *M. angulis sulcis inæqualibus*, labio interiore rugoso, costis alternis.

Gualt. Test. t. 49. f. G. d'Arg. Conch. t. 13. f. M.

Habitus et structura *rubeculæ*, at octies major, nec vivide pictus, sed colore testaceo fasciis fuscis longitudinalibus. Apertura intus saturate crocea, rugis albis.

Apparently this was the *Triton pileare* of authors,—not the Mediterranean shell (*T. corrugatus*) termed *M. pileare* in the 'Systema.'

M. PILEUS HELVETICUS. *M. angulis rotundatis*, tuberculis conicis, apertura utrinque canaliculata.

d'Arg. Conch. t. 12. f. D. Rumph. t. 28. f. D.

Testa ovata, admodum inæqualis, adspersa nodis conicis tuberculatis inæqualibus. Costæ latere antico membranaceæ, primæ 2 oppositæ, reliquæ alternæ. Color flavus. Apertura hians, antice et postice canaliculatæ, faux intus striata. Labium exterius dentatum, intus dilatato-membranaceum.

This suits very fairly the *Triton lampas* of authors; far better, indeed, than does the *M. Lampas* of the 'Museum Ulricæ.'

M. SUBULATUS. *M. ecaudatus*, pyramidalis.

Testa subulata instar turris, anfractuum undecim, reticulata striis elevatis decussantibus punctis contignationem eminentibus. Costæ oppositæ et alternæ. Color albus, maculis flavescentibus. Apertura ovata. Labium exterius crassum, intus dentatum. Interius dentato-glabrum.

Both *Triton! maculosus* and *Ranella candisata* approach the ideal portrait, yet neither of them precisely agrees.

Under the name of *Trochus turritus* our author appears to have first described his *Murex radula*.

Trochus exumbilicatus, pyramidatus, anfractibus duplici serie muricatis. Gualt. t. 58. f. F.

Testa elongata, flavescens s. testacea. Anfractus 16, connexi suturâ crenulatâ, dorso duplici serie instructi punctis eminentibus pallidis. Aper-tura subtetragona, subtus in canalis rudimentum desinens.

The *Murex Neritoideus* of the 'Systema' was thus described.

LYRA NERITOIDES. L. testa nodosa subrotunda.

Gualt.

Testa crassa, ponderosa, alba cum rubedine tincta, figura Neritæ, magnitudine juglandis, cincta anfractibus 5 e nodis obtusis crassiusculis. Labium interius depressum, longitudine pictum macula ferruginea.

TROCHUS.

Testa conica. Apertura quadrangularis, basi columella contorta, sinu descendens.

The last five words had been substituted for "absque sinu evidente."

T. MACULATUS. T. contorto-umbilicatus conicus, vertice subnodoso.

The printed description and the synonymy are so very dissimilar to the written one, that I entertain no doubt that an early definition of *T. Niloticus* (with references to "Olear. Mus. t. 9. f. 5" and "Bonan. 3. f. 102") was transmuted into that of a granular species, by the addition of "quasi granis exasperata," &c.

T. SOLARIS was not mentioned in the manuscript.

T. PERSPECTIVUS. T. crenato-umbilicatus convexus obtusus: margine acuto.

"Bonan. 3. f. 27, 28" was quoted, as illustrative: "costa crenata", not "costa concava", was the earlier reading.

T. HYBRIDUS. T. crenato-umbilicatus, convexus, undique obtusus.

The proposed name was *T. spurius*. The "absque carina, rotundata" was "absque angulis, glabra": "albo, flavoque" preceded "variegata".

T. PHARAONIUS. T. umbilicatus subovatus striatus, punctis globulosis, labio dentato.

"Habitat in mari rubro, frequens. D. Hasselquist." was written: the final remark was absent.

T. MAGUS. T. umbilicatus convexo-conicus nodosus.

The "cinereo nebulosa" was a manuscript emendation by Linnæus.

T. MURICATUS. Except that "obverse" precedes "ovata", both the diagnosis and the details are precisely similar to the printed account.

T. SCABER. T. umbilicatus subovatus, sulcis alternis majoribus moniliformibus.

The erroneous figure of d'Argenville was not cited in the original, nor, indeed, was any name attached to the description. The whorls were said to number from 6 to 8 (not 4 or 5); and the aperture was termed "ovata," not "subrotunda." "Pallida", the final remark, and the present construction and enlargement of the passage relative to the inner lip (which at first ran thus, "Labium posticum coadunatum, sinu postico excisum"), had been added by Linnæus himself.

T. LABIO. *T. exumbilicatus ovatus striato-tuberculatus, labio dentato.*

The erroneous figure of d'Argenville was not cited; "variegata" was the earlier reading of "marmorata"; "aliquot" of "et punctis"; "externo" of "margine". Linnæus himself had enlarged the account of the inner lip from the earlier "postice sinu excisum" to its present length.

T. ZIZYPHINUS. *T. umbilicatus conicus, striis papillosis.*

This is clearly not the imperforated *zizyphinus* of the 'Systema.' Gualtieri was not referred to; "ambitu marginati", and "in aliis clausus", were not in the copy: "columella parum obliqua" was an addition in the Linnean handwriting.

T. TELESCOPIUM. *T. exumbilicatus pyramidatus, striis exaratus; labio postice recurvato, spirali, integro.*

"Bon. 92", and "Klein 26. Pseudotrochus striatus", were the additional synonyms of the MS.

T. DOLABRATUS. *T. umbilicatus, labio postico recurvato sulcato, ovato-pyramidalis, glaber.*

The whorls were at first called imbricated. The "basis rotundata", and "in superioribus vero unica", had been added by Linnæus.

TURBO.

Testa conica. Apertura orbicularis, integra.

T. PERSONATUS. *T. exumbilicatus inermis convexus, labio postice diducto.*

The I of the reference to Rumphius was a misprint for the written l. A drawing of Gualtieri (t. 64. f. O), which accords not with the description of this species, was an additional synonym. The name had been added subsequently. *Turbo cidaris* agrees in most respects.

T. PETHOLATUS. *T. exumbilicatus ovatus lævis, anfractibus sursum obsolete angulatis.*

The written version furnishes us with the additional synonyms of "Gualt. t. 64. f. F.", and "Klein 40. t. 2. f. 51."; the latter (also cited in the 'Systema') was added by our author when he admitted the at first excluded 5. 6 of the synonym of Rumphius. The admission of the rounded-whorled variety? was evidently an after-thought.

T. CHRYSOSTOMUS. *T. exumbilicatus subovatus rugosus striatus, spinis fornicatis.*

"Klein 41. t. 7. f. 126" (cited in the 'Systema'), and the printed "in superiore serie majoribus". had been added by Linnæus in the original account.

T. TECTUM-PERSICUM. *T. exumbilicatus subovatus, spinis obtusis reflexis, subtus papillosus.*

"Forte sola varietas sequentis a loco" has been remarked by our author, who did not admit in his MS. the deceptive figure of d'Argenville.

T. PAGODUS. *T. exumbilicatus conicus spinis obtusis concatenatis, subtus papillose striatus.*

Neither "acuminata", nor the inappropriate "rotundata", were in the original account of this well-known species.

T. CALCAR. *T. exumbilicatus depressus, anfractibus supra spinis fornicato-compressis scabris.*

To his printed synonyms Linnæus has added "Gualt. t. 65. f. N. P.", "List. Hist. t. 608. f. 46", and "Klein t. 1. f. 27". The "fornicatis" was an emendation.

T. MARMORATUS. *T. exumbilicatus subovatus nodosus lævis.*

T. PICA. *T. umbilicatus lævis conicus denticulo umbilicali.*

"Habitat in Barbados, Jamaica", which corrects the stated locality of the 'Systema,' and "Bonan. 29, 30", "Pet. Gaz. t. 70. f. 9", were the additional particulars of the manuscript copy.

T. ARGYROSTOMUS. *T. umbilicatus subovatus, striatus lineis dorsalibus.*

The erroneous references to Gualtieri and d'Argenville, were not present: "os argenteum variegatum" was written after the reference to Rumphius, which name belongs to figure 3, not to 4, whose colouring, moreover, excludes it from being illustrative. The intended specific name was "os variegatum."

T. MARGARITACEUS. *T. exumbilicatus subovatus, (? angulo) dorsali elevato, ore postice diducto.*

Rumphius was not referred to in the original, where "subtilissimis" was in the place of "variis": the printed "margine albo" was a subsequent emendation.

T. DELPHINUS. *T. umbilicatus depressus hispidus, spinis ramosis.*

"Pet. Amb. t. 3. f. 1", and "Grew Mus. t. 11. f. 5, 6", were also cited.

T. DISTORTUS. *T. umbilicatus muricatus undique spinulis brevibus.*

The final remark was not in the original.

T. SCALARIS. *T. cancellatus conicus, anfractibus distantibus.*

"Pretium immensum, sæpe 100 ducatorum", was the final remark instead of the printed one. "Pet. Amb. t. 2. f. 9", was an additional synonym in the written version.

T. CLATHRUS. *T. cancellatus pyramidatus, anfractibus contiguis lævibus.*

All the synonyms of the tenth edition of the 'Systema,' together with "Johnst. t. 11, f. 9", were present in the MS., but most of them, together with the final remark, had been subsequently added to the copy by our author.

T. CRENATUS. *T. cancellatus pyramidatus, anfractibus contiguis supra crenatis.*

The details of the 'Museum' were referred to before their publication. "Pyramidalis" was the earlier reading for "turrita"; "sæpe" was absent: "transversim" preceded "crenati."

T. UVA. *T. cancellatus ovatus, anfractibus contiguis imbricatis.*

"Pet. Gaz. t. 27. f. 2. Olivaris" was the unpublished additional synonym, and the intended name was borrowed from that work. "Longitudinalibus" was "transversis" in the copy, where "ut latus planum non conspiciatur exterius distincta linea" terminated the account of the volutions: the colouring ("alba") was not indicated.

T. CORNEUS. *T. umbilicatus*, anfractibus teretibus decussatim striatis, oris margine reflexo.

The "s. cornea", the name, and the "vix manifeste" had been added to the original account, which latter was referred to previous to its publication.

T. IMBRICATUS. *T. pyramidalis*, anfractibus deorsum subimbricatis.

The "præcedentibus tribus", here mentioned, were not those which the species now follows, but nos. 358, 359, 360, after which it was placed in the MS. "Grisea" had been added by Linnæus.

T. REPLICATUS. The entire account of this shell was interpolated in the MS. by Linnæus.

T. ACUTANGULUS. *T. pyramidalis*, sulco unico acuto majore.

The last four words of the details were written subsequently to the earlier description, to which no name was then appended.

T. DUPLICATUS. *T. pyramidalis*, sulcis 2 acutis.

"Bonan. 3. f. 114", and "List. 160. t. 3. f. 7", were additional synonyms; both, however, were quoted in the 'Systema.' The "color albus", and the term "obtusiores", were in the Linnean handwriting.

T. TEREBRA. *T. pyramidatus*, sulcis 6 acutis.

"Bonan. 3. f. 115" was in the place of the doubtful figure of Rumphius; the indicated colouring was simply "pallida": the "obsoletum" was an afterthought.

HELIX.

Testa cochleata, lævis. Apertura subrotunda segmento circuli exempto.

Except *scarabæus* and *amarula*, the members of this genus were located in the same group as in the published edition.

H. SCARABÆUS. *Morion ovatus* subanceps, labio utroque tridentato.

The "ovata, adeo" has replaced the earlier "ita", and "angulata" the original "articulata". The account of the aperture was not inserted in the manuscript, wherein "List. Hist. 577. f. 31", and "Klein 11. t. 1. f. 23", had been inserted in the Linnean handwriting.

H. LAPICIDA. *H. marginata* perforata convexa carinata.

"Cincta" was a press emendation. The only written synonym was "Faun. Suec. 1298".

H. OCLUS-CAPRI. *H. marginata* perforata subcarinata.

"Pet Gaz. t. 76. f. 6." was indicated as a synonym. The name was Latinized from the "*l'œil de bouc*" of d'Argenville, who has, however, represented an utterly different shell.

H. CAROCOLLA. *H. submarginata* imperforata carinata, labio interiore recto.

D'Argenville's figure was, evidently, not at first considered sufficiently illustrative to be referred to: it was not cited in the written copy. "Conicoplaniuscula" was the reading for "convexa", "segmento circuli" (the $\frac{1}{4}$ without any sequence was absurd) for "semiovata": the size, as usual, was not given.

II. CORNU-MILITARE. *H. marginata imperforata subcarinata, labio interiore explanato.*

The deceptive figure of Gualtieri was not at first cited.

H. CORNEA. *H. marginata convexa umbilicata, spira plana.*

"Faun. Suec. 1304" was in place of the reference to 'Lister's English Conchology,' a work apparently unknown to our author when he first drew up the Museum Catalogue. I doubt the identity of this shell (the intended name for which was *tabellaris*) with the cornea of the 'Systema.'

H. CORNU-ARIETIS. *H. utrinque depressa.*

"List. Hist. t. 136. f. 40" was written by our author in the manuscript copy.

H. AMPULLACEA. *H. subrotunda, sursum ventricosior glabra.*

The original reading of "anfractus superne ventricosi" was "abdomen superne ventricosius". The erroneous reference to Gualtieri was not at first attached to the description. The species of the Museum was evidently distinct from that of the 'Systema.'

H. GLAUCA. *H. subrotunda acuminata, labro postice marginato.*

H. CITRINA. *H. umbilicata convexa obtusa.*

The final remark was an afterthought.

H. ARBUSTORUM. *H. marginata perforata convexo-acuminata, ore suborbiculari, margine duplici, antice elongato.*

"Faun. Suec. 1295" was the only synonym; the work of Lister on English Conchology not having been at first known to Linnæus.

H. UNGULINA. *H. marginata perforata spiralis convexa, ore suborbiculato.*

The "Gualt." was a misprint for the written "Rumph."

H. LUTARIA. *H. ovata-oblonga umbilicata, interne coloratiore.*

"Habitat frequens in lutosiis fluviis, lacubus." May not the *Valvata piscinalis* be the shell intended?

H. PERVERSA. *H. ovato-oblonga subperforata glabra.*

"Pet. Gaz. t. 44. f. 7", and "Grew. Mus. t. 10. f. 9", cited in the 'Systema', were also referred to in the MS. "Alba", and "in quibusdam", were interpolations in the Linnean handwriting: *H. sulphurata* was the intended designation.

H. IANTHINA. *H. subrotunda obtusa patula diaphana.*

The entire account of this beautiful shell was written by Linnæus subsequently to the labours of his amanuensis: the twelve last printed words were not present. The cited figure of Gualtieri was not admitted, as a representation, but only alluded to in the final remark of "Confer Gualt. t. 64. f. O." "List. Hist. t. 572. f. 23", and "Sloan. Jam. 2. p. 239. t. 1. f. 4" were indicated as delineations.

H. NEMORALIS. *H.*

"Habitat ubique in Europæ nemoribus", and "Argen. t. 32. f. 8", were the unprinted additions. Lister's English Conchology was not, of course, mentioned. "Flavescens", and "nigro-purpurascens", were not in the original.

H. HÆMASTOMA. *H. imperforata subrotunda fusca fascia longitudinali subrecta alba, ore purpureo.*

H. DECOLLATA. *H. elongata lævis truncato-mutilata.*

"Pet. Gaz. t. 66. f. 1", and "Habitat in Arabia. Hasselquist. Santa Cruz. Petiv." were the unprinted additions. The entire account was in the handwriting of our author.

H. AMARULA. *Nerita edentula oblonga, anfractibus multifariam denticulatis.*

Our author was evidently puzzled as to the generic position of this peculiar-looking shell, for he has written "Habitum accedit ad *Volutas* vesperiliones, ore *Helicibus*, sed labium interius planum, et affinitas cum antecedenti fiat, ut hic relinquatur." The preceding shell alluded to was *N. corona*.

H. NERITOIDEA. *H. convexa longitudinaliter striata.*

The erroneous reference to Gualtieri was not present in the written copy.

H. PERSPICUA. *H. convexo-ovata, labio interiore nullo, apertura ad apicem usque pervia.*

The then unpublished details of both this and the preceding were referred to in the tenth edition of the 'Systema.' Patens was the proposed specific appellation.

H. HALIOTOIDEA. *H. depresso-planiuscula obtusissima, ore ovali dilatato.*

None of the cited figures were at first accepted by our author, who only added that of Rumphius to the earlier description, and wholly omitted the rest. "Transverse" preceded "striata".

NERITA.

Testa subrotunda, obtusa. Labium interius planum, transversim truncatum, depressum.

The generic arrangement was similar to that of the printed version.

N. CANRENA. *N. edentula umbilicata, spira mucronata, labio reflexo bifido.*

When Linnæus first described this shell, under the appellation of *N. musica*, he did not admit a single one of the cited figures as illustrative.

N. GLAUCINA. *N. edentula convexa, umbilico simplici semiclauso gibboso dicolore.*

None of the deceptive figures were at first referred to, but had been added at a subsequent period; and that of Rumphius again erased. *N. luteola* was the intended name.

N. ALBUMEN. *N. edentula subrotunda, umbilico teretiusculo.*

The present heading agrees with the subsequent details, which could not be affirmed of the printed one borrowed from the 'Systema.' The MS., in some degree, clears up the extraordinary confusion in which the Linnean species was enveloped. There were two *N. albumen* in the written copy. The shell here described (assuredly not the lobed *albumen* of the 'Systema') was originally termed *hepatica* or *luteola* (for both had been erased). The true *albumen* was described as "edentula subrotunda, umbilico subcordato.

labri interioris lobo explanato" and the only figure referred to was "Rumph. t. 22. f. B." "Klein 13. *Platystoma vitellum compressum*" was also mentioned. This description was suppressed, and the other species retained, with the erroneous designation, and the faulty synonymy, attached. Nor was this the only change. In order to include the *Natica vitellus* of authors ("Rumph. t. 22. f. A. *Valvata lævis* prima s. *vitellus*" had been quoted by our author) the "aut lutea", "aut maculis albis", had been added to the earlier description: so, likewise, had been "Apertura rotundata, semicordata", and "glabrum, planiusculum, nitidum." I suspect, then, that whilst the ideal of the *albumen* of the 'Systema' was any hemispherical or flattened *Natica* with a labial lobe (such as *Nat. albumen*, *didyma*, *olla*, &c.), the *albumen* of the 'Museum', as printed, was composed of *Natica rufa* ("Rumph. 22. f. D." was quoted in the MS.) and *vitellus* (for A, not B, of Rumphius was the letter indicated in the MS.).

N. MAMMILLA. The entire account of this common shell was added in the Linnean handwriting. The inappropriate "aut lutea" was not at first present.

N. CORONA. *N. edentula*, simplici spira spinosa.

"Pet. Amb. t. 3. f. 4.", a mere copy of the Rumphian figure, was also quoted. The 19 in the reference to d'Argenville was a misprint for the written 10. *N. spinosa* was the intended designation.

N. RADULA. *N. edentula sulcata*, tuberculis æqualibus.

The *valvata granulata* of Rumphius (t. 22. f. M.) was referred to as illustrative.

N. CORNEA. *N. edentula*, obsolete striata.

N. BIDENS. *N.*

"Obsoletis" followed "duobus": the name had been written subsequent to the description.

N. VIRGINEA. *N. subedentula ovata lævis*.

"Dentibus pluribus minutissimis" preceded "oris"; "Pet. Gaz. t. 11. f. 3" was in the place of the delusive figure of d'Argenville: the variety *d* was a subsequent addition.

N. POLITA. *N. lævis*, labiis dentatis.

The *l* in the synonym of Rumphius was a misprint for the written *I*.

N. PELERONTA. *N. striata*, labiis dentatis, interiore planiusculo rugoso.

The erroneous synonym was added, along with the name *peleronta*, to the written details: *N. rufa* was the original appellation.

N. ALBICILLA. *N. striata*, labiis subdentatis, interiore tuberculato.

N. HISTRIO. *N. sulcata*, transversim striata, labio interiore dentato.

The name, and the synonym, were added by Linnæus to the written details.

N. PLICATA. *N. sulcata*, labiis profunde dentatis, interiore rotundato, exteriore utrinque dentibus acutis conicis.

The variety alluded to was a subsequent addition. The details of the 'Museum' had been quoted, in anticipation, for this species.

N. GROSSA. *N. sulcata* labiis dentatis, interiore convexo rugoso.

N. CHAMÆLEON. *N. sulcata*, labiis dentatis, interiore rugoso tuberculato.

"Habitat in Banda", and "compositis" after "subtilissimis", are the unprinted additions.

N. UNDATA. *N. sulcata*, labiis dentatis, interiore rugoso, tuberculato.

The erroneous figure of Gualtieri was not cited when the description was drawn up, but added to the details, along with "confluentibus. *Spira acuta prominens*", when the present name was substituted for the earlier *nebulata*.

N. EXUVIA. *N. sulcata*, labiis dentatis, interiore denticulato.

HALIOTIS.

Testa univalvis, patens, convexa. *Spira obsoleta*, lateralis. Foramina lateralia pervia.

H. MIDÆ. *H. subrotunda*, utrinque nitida.

Humana was the intended specific appellation.

H. TUBERCULATA. *H. subovata*, rugis transversis tuberculatis.

The reference to Lister was an emendation.

H. STRIATA. *H. ovata*, transversim rugosa, longitudinaliter striata.

No name was attached to either this or any member of the genus, except the first.

H. VARIA. *H. ovata*, striis longitudinalibus, majoribus tuberculatis.

H. MARMORATA. *H. ovata*, striis longitudinalibus, transversis obsoletis.

H. ASININA. *H. oblonga*, extra foramina angulata, striis elevatis.

H. PARVA. *H. ovata*, angulo inter foramina et spiram.

All the headings in this genus are similar to those in the 'Systema'.

PATELLA.

Testa conica, convexa. *Spira regularis nulla vera*.

The limits of this genus were precisely those of the printed edition.

P. EQUESTRIS. *P. ungue fornicali nutante*.

P. NERITOIDEA. *P. integra ovata*, apice subspirali, labio laterali.

"Supra" preceded "convexa", and the "fere" was before "apice".

P. CHINENSIS. *P. conica latior lævis*, labio interno laterali.

This was an addition to the original catalogue.

P. PORCELLANA. *P. basi interne labiata*, pone mucronato-subspiralis.

P. CREPIDULA was not mentioned in the manuscript.

P. SACCHARINA. *P. margine sinuato*, carinata, costis 7.

"Pet, Amb. t. 3. f. 3", and "Klein 117. t. 8. f. 4", were additional synonyms: both are in the 'Systema.'

P. BARBARA. *P. dentata*, costis 19 elevatis.

P. GRANULARIS. *P. margine dentato*, striis elevatis mucronibus imbricatis.

The erroneous reference to Gualtieri was not in the original.

P. GRANATINA. *P. margine angulato*, striis 11 lævibus.

"Interius" was the earlier reading of "subtus".

P. TUBERCULATA. *P. dentata conica tuberculata, postice sima.*

Sima was the earlier name in the MS., but was erased by Linnæus.

P. LUTEA. *P. integerrima striata, vertice mucronato inflexo.*

P. UNGUIS. *P. ovali-oblonga, apice emarginata, mucrone dorsali carinato.*

Unguiformis was the intended appellation.

P. TESTUDINARIA. *P. ovata glaberrima integerrima.*

P. RUSTICA. *P. integra, striis 50 obtusiusculis.*

P. FUSCA. *P. ovata integerrima, striis elevatis, vertice obtuso.*

The intended name was *cinereo-nigricans*.

P. CRUCIATA. *P. ovalis convexa integerrima, cruce picta.*

P. RETICULATA. *P. conica compressa, superficie reticulata.*

The suggestion I have elsewhere made that this uncertain shell might prove the European *Pedicularia*, induces me to remark that, although *P. Sicula* has been supposed to be a comparatively modern discovery, Favaune had long ago delineated it in the fourth plate (f. H. 1.) of his enlarged edition of d'Argenville.

P. NIMBOSA. *P. conica ovalis, costis confertis, vertice perforato.*

The discrepancy between the heading borrowed from the 'Systema', and the after details, is removed by the substitution of the original one. The shell was termed *perforata* (not *nimbosa*), and was wrongly identified by Linnæus with the striated brown *Fissurella* of the 'Systema'.

In addition to the printed species, the two following were present in the manuscript copy.

P. SOLARIS. *P. ovata integerrima, striis subnodosis, vertice acutiusculo.*

Testa ovata, diaphana, magnitudine extimi articuli digiti, margine integerrimo, lævis, striis subtilissimis inæqualibus numerosissimis, fasciis longitudinalibus rubris albo passim maculatis. Mucro acutiusculus obliquus albidus.

This was placed in the section having a simple margin.

P. PERFOLIATA. *P. conica, reclinata, perfoliata.*

Testa magnitudine coryli nucis, conica, sed cono retro inclinato, acutissima, alba, imbricata lamellis horizontaliter testam cingentibus. Margo integer, ovalis, antrorsum gibbus s. dilatatus. Cavitas profunde glabra.

This description very fairly suits the *Patella antiquata* of the twelfth edition of the 'Systema'.

DENTALIUM.

Testa univalvis, subcylindrica, utrinque aperta. Spira regularis nulla.

Although the *Serpulæ* were intermingled, it is clear that they did not accord with the above definition.

D. ELEPHANTINUM. *D. subulatum subarcuatum, angulatum.*

The synonymy of the tenth edition was appended, Lister excepted; the erroneous 13 of the reference to the Gazophylaceum was erased. *Dens elephantis* was the proposed trivial name.

D. ENTALIS. *D. subulato-cylindricum*, subarcuatum.

The terminal details were not furnished.

D. dentalium was the intended appellation.

SERPULA.

In the original version of the 'Museum Ulricæ,' the members of this genus are not separated from the *Dentalia* (a proof, among many others, of the early date of this catalogue). Linnæus, however, when revising the transcript, had meditated the withdrawing of *S. arenaria* and *lumbri-calis*, and constituted for them a nameless genus with the following definition :—

Testa tubulosa, isthmis concamerata, dissepimentis integris, nec perforatis, s. communicantibus.

This genus would have been the equivalent of the modern *Vermetus*.

S. TRIQUETRA. *D. triquetrum*, adhærens.

The reference to Gualtieri (whose figure was somewhat uncertain, yet probably designed for *Vermilia triquetra*) was queried. The proposed name was *D. parasiticum*.

S. CONTORTUPLICATA. *D. teretiusculum*, depressum, rugosum.

There was at first no name to the description of this shell; but it was added in the handwriting of Linnæus.

S. GLOMERATA. *D. teres glomeratum*.

The 'decussato-rugosa' of the 'Systema', applicable to the '*Vermetus subcancellatus*', the shell designed in that work, was not inserted. Gualtieri's figure is that of *Vermetus glomeratus*, for the colouring of which 'alba' would be a most inappropriate term.

S. LUMBRICALIS. *D. spira divaricata teretiusculum*, integrum.

D'Arg. t. 29. f. 1. was an additional synonym.

S. ARENARIA. *D. teres rectiusculum intestiniforme*.

Despite the name borrowed from Rumphius, the *Vermetus gigas* was the object defined in the tenth edition of the 'Systema'. The absence from the manuscript of the reference to Gualtieri's drawing of that shell, and "rectiusculum" in the written diagnosis, confirms the conclusion previously arrived at, that the *Septaria arenaria* of authors was the species intended in the 'Museum Ulricæ': it was subsequently termed *S. polythalamia* by Linnæus. The delusive "subangulata" of the supposititious diagnosis was of course absent.

The *V. gigas* was probably intended by the following unpublished description.

D. INTESTINIFORME. *D. teres flexuosum intestiniforme*.

Testa rudis crassitie digiti et ultro, flexuosa vario modo in diversis, integra, intus lævis.

S. ANGUINA.

The two very dissimilar *Siliquariæ* united under this appellation in the 'Museum Ulricæ,' were originally held distinct. The prickly variety was the unpublished type, and was thus defined :—

D. ANGUINUM. *D. spira inæquali angulata aculeata, sulco longitudinali perforata.*

Rumph. 125. t. 41. f. H. Solen anguinus.

Lang. Test. 6. Tubulus vermicularis crista dentata.

Testa albida, teretiuscula, angulis 9 obsoletis. Anfractus inæquales, nunc confertiores, nunc remotiores. Sulcus longitudinalis in superiore latere perforatus serie punctorum. Spinæ breves, fornicatæ ad angulos in latere inferiore.

Condensation, that peculiar faculty of the mental organization of Linnaeus, induced him to suppress this description, and attach the species, as a variety, to the form he had simultaneously characterized as

D. spira elongata, teretiusculum, inerme, fissura longitudinali.

Gualt. test. 10. f. z.

To this latter the published details belong, except the expression "passim concatenata et quasi poris pertusa" (which was a subsequent and fallacious addition), and the account of the variety.

S. PENIS. *D. teres, extremitate radiata disco cylindris poroso.*

"Bonan. i. f. 38.", indicated in the tenth edition of the 'Systema', was among the synonyms. The "Stigma, &c." was an addition; so too were "lævis," "tubulosis", and "æqualibus". The term "hemisphærico" has replaced the earlier "convexo."

In addition to the published species, the *S. Spirorbis* of the 'Systema' appears to have been indicated as

D. PLANORBE. *D. spira plana, adhærens.*

It. W. Goth. 170. Dentalium testa spirali plana adhærente.

Planc. Conch. 13. n. 3. Vermiculus in littore Veneto foliis algæ adhærens.

Testa minima, magnitudine nuper ab ovo exclusæ cochleæ, cujus formam omnino gerit, at plana omnino est, et altero latere omnino fuci foliis adhæret.

This was evidently different from the *Serpula planorbis* of the 'Systema.'

Catalogue of the Dipterous Insects collected at Makassar in Celebes, by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

(Read June 2nd, 1859.)

Fam. CULICIDÆ, *Haliday.*

Gen. MEGARHINA, *Desvoidy.*

1. MEGARHINA IMMISERICORS, n. s. *Mas. Nigra, squamosa, capite thoraceque viridibus, hujus disco cupreo, proboscide palpis pedibusque purpureis, femoribus subtus fulvis, tarsis intermediis albo bifas-*

ciatis, tarsis posticis albo unifasciatis, pectore argenteo, abdomine cyaneo fasciculis lateralibus albis subapicalibus nigris apicalibus auratis, alis subcinereis apud costam nigricantibus.

Male. Black. Head and thorax with green metallic scales; disc of the latter with cupreous scales. Proboscis, palpi, and legs purple; femora tawny beneath; middle tarsi with two white bands; hind tarsi with one white band. Pectus silvery. Abdomen blue, widening from the base to the tip, with small white tufts of hairs along each side; four larger black subapical tufts, two gilded apical tufts. Wings slightly greyish, blackish along the costa; veins black. Length of the body 5 lines; of the wings 8 lines.

Gen. *CULEX*, *Linn.*

2. *CULEX OBTURBANS*, n. s. *Fæm.* Nigricans, thoracis disco fusco, abdomine cupreo apice viridescente, gutta subapicali alba, fasciis ventralibus latis albis, pedibus subcupreo squamosis, femoribus subtus albis, alis cinereis.

Female. Blackish. Proboscis pale; its sheaths dark, longer than the thorax. Disk of the thorax with brown tomentum. Abdomen with cupreous tomentum, and with a slight greenish tinge towards the tip; a white subapical dot; underside with broad white bands. Legs with a cupreous tinge; femora whitish beneath. Wings grey; veins black, fringed. Length of the body $2\frac{3}{4}$ lines; of the wings $4\frac{1}{2}$ lines.

3. *CULEX IMPATIBILIS*, n. s. *Mas.* Subcupreo-niger, capite albo punctato, pectore albo guttato, abdomine fasciis interruptis albis, genubus albis, femoribus posticis albis apice nigris, tarsis intermediis basi albis, tarsis posticis albo bifasciatis, alis cinereis.

Male. Black, with a very slight cupreous tinge. Head with shining white points. Sheaths of the proboscis dark tawny, longer than the thorax. Pectus with shining white dots. Abdomen with interrupted shining white bands, which are most complete beneath. Knees white; hind femora white, with black tips; middle tarsi white at the base; hind tarsi with two white bands. Wings cinereous; veins black, fringed. Length of the body 2 lines; of the wings 3 lines.

4. *CULEX IMPELLENS*, n. s. *Fæm.* Fuscus, subtus testaceus, proboscide nigricante albo-fasciato, pedibus pallidis, femoribus albidis apice obscurioribus, tarsorum articulis basi albis, alis cinereis.

Female. Brown, testaceous beneath. Proboscis blackish, with a white band, a little longer than the thorax. Legs with pale reflections; femora whitish, with darker tips; joints of the tarsi white at the base. Wings grey; veins black, fringed. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. *ANOPHELES*, *Meigen.*

5. *ANOPHELES VANUS*, n. s. *Mas.* Cinereo-fuscus, gracilis, antennis

late plumosis, pedibus testaceis longis gracillimis, tarsorum articulis basi albis, alis subcinereis antice nigro punctatis.

Male. Cinereous brown, slender. Proboscis full half the length of the body. Palpi nearly half the length of the body. Antennæ broadly plumose. Legs testaceous, long, very slender; joints of the tarsi white at the base. Wings slightly cinereous, with black points on the fore part; veins black, fringed. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Fam. TIPULIDÆ, *Haliday.*

Gen. LIMNOBIA, *Meigen.*

The following species, in the structure of the wing-veins, does not accord with any of Meigen's divisions of the genus. The mediastinal vein ends at about three-fourths of the length of the wing; the subcostal ends at seven-eighths of the length, and is connected with the radial by a transverse veinlet at its tip; the radial, the cubital, and the 1st and the 3rd externo-medial are long and of equal length; the 2nd externo-medial springs from the 1st, at one-fourth of its length; the 3rd externo-medial is connected by a transverse veinlet near its base with the subanal.

6. LIMNOBIA IMPONENS, n. s. Ochracea, palpis antennisque nigricantibus, his thoracis dimidio brevioribus, thorace antico valde elongato et attenuato, abdomine piceo, alis subcinereis longis angustis, stigmate nigricante longissimo, halteribus piceis basi testaceis.

Ochraceous. Proboscis, palpi, and antennæ blackish, the latter moniliform setaceous, not half the length of the thorax. Thorax much elongated and attenuated in front. Abdomen piceous. Wings greyish, long narrow; veins black, testaceous at the base and along the costa from the base to the stigma, which is blackish and very long; halteres piceous, testaceous at the base. Length of the body 7 (?) lines; of the wings 16 lines.

Gen. TIPULA, *Linn.*

7. TIPULA INFINDENS, n. s. *Fem.* Fusca, capite apud oculos subtusque cinereo, antennis basi testaceis thorace brevioribus, thorace vittis quatuor ochraceis, abdominis apice ochraceo, pedibus fulvis longissimis, femoribus apice fuscis, alis cinereis apud costam luridis.

Female. Brown. Head cinereous about the eyes and beneath. Antennæ setaceous, submoniliform, testaceous at the base, shorter than the thorax. Thorax with a slight cinereous tinge, and with four dull ochraceous stripes. Abdomen ochraceous at the tip. Legs tawny, slender, very long; tips of the femora brown. Wings cinereous, lurid along the costa to the stigma, which is brown; veins black, tawny at the base. Length of the body 10 lines; of the wings 24 lines.

8. *TIPULA INORDINANS*, n. s. *Mas.* Fusca, capite pallide cinereo vitta fusca, antennis testaceis thorace valde longioribus, articulis basi nigris nodosis setigeris thorace vittis quatuor pallide cinereis, abdominis lateribus ventrequ testaceis, segmentis basi nigro postice albomarginatis, pedibus nigris longissimis, femoribus dimidio basali testaceis apices versus albo fasciatis, tibiis albo fasciatis, tarsis albo bifasciatis, alis hyalinis striga costali subapicali nigricante, venis transversis nigro nebulosis.

Male. Brown. Head pale cinereous, with a brown stripe. Antennæ testaceous, slightly setaceous, much longer than the thorax; joints at the base black, nodose, setigerous. Thorax with four pale cinereous stripes; pectus pale cinereous. Abdomen testaceous beneath and along each side, thickened towards the tip; segments whitish at the base, black along the hind borders. Legs black, slender, very long; femora testaceous for half the length from the base, with a white subapical band; tibiæ with a white band beyond the middle; tarsi with two broad white bands. Wings hyaline, with a blackish costal subapical streak; veins and stigma black, the latter small; transverse veins and forked subapical vein clouded with black; veins testaceous. Length of the body 9 lines; of the wings 16 lines.

Gen. CTENOPHORA, *Fabr.*

9. *CTENOPHORA INCUNCTANS*, n. s. *Mas.* Atra, capite thoraceque læte ochraceis, antennarum ramis longis æqualibus subpilis, abdomine basi ochraceo. *Fæm.* Thoracis disco saturate ochraceo. *Var. β.* Capite thoraceque saturate ochraceis, alis albido strigatis et guttatis. Deep black. *Male.* Head and thorax bright ochraceous. Antennæ with long equal slightly pilose branches. Abdomen ochraceous at the base. *Female.* Disc of the thorax deep ochraceous. *Var.* Head and thorax deep ochraceous. Wings with five whitish streaks and two exterior elongated whitish dots. Length of the body 8–10 lines; of the wings 18–22 lines.
10. *CTENOPHORA GAUDENS*, n. s. *Mas et Fæm.* Læte ochracea, abdomine apicem versus nigro, pedibus nigris, femoribus ochraceis apice nigris, tibiis fascia basali candida, alis nigricantibus basi ochraceis, fascia exteriore albida.

Male and Female. Bright ochraceous. Abdomen black towards the tip. Legs black; femora ochraceous, black towards the tips; tibiæ with a snow white basal band. Wings blackish, ochraceous at the base, with a whitish exterior band which is attenuated hindward. *Male.* Antennæ with long, equal, slightly pilose branches. Length of the body 7–10 lines; of the wings 14–16 lines.

Fam. STRATIOMIDÆ, *Haliday*.Gen. PTILOCERA, *Wied.*

- 11.
- Ptilocera smaragdina*
- .
- Walk. Dipt.*
- pt. 3. 525.

Inhabits also the Philippine Islands.

12. *PTILOCERA SMARAGDIFERA*, n. s. *Mas*. Nigra, thorace pubescente vittis duabus smaragdinis, lateribus purpurascentibus, abdomine nigricanti-cyaneo squamis lateralibus viridibus, tarsis basi obscure rufescentibus, alis subhyalinis, dimidio basali antice nigricante postice cinereo.

Male. Black. Thorax thickly pubescent, purplish along each side, with two emerald green dorsal stripes. Abdomen blackish blue, with green scales along each side. Tarsi dark reddish towards the base. Wings nearly hyaline; basal half blackish in front, cinereous hindward; veins black, yellow along the costa exteriorly. Length of the body 5 lines; of the wings 8 lines.

Gen. HERMETIA, *Latr.*

13. *HERMETIA REMITTENS*, n. s. *Mas et Fæm.* Nigra, capite antico livido, antennis basi subtus lividis apice albis, thorace vittis tribus cinereis, abdomine æneo-nigro, tibiis basi tarsisque albidis, alis nigricantibus basi subhyalinis. *Mas*. Abdominis dimidio basali livido.

Male and Female. Black. Head livid in front; a whitish line along the eye on each side of the front. Antennæ livid beneath towards the base; apical joint elongate-fusiform, white at the tip, as long as all the other joints together. Thorax with 3 indistinct cinereous stripes. Abdomen slightly bronzed, livid for half the length from the base in the male. Tibiæ at the base and tarsi whitish. Wings blackish, nearly hyaline at the base; halteres livid. Length of the body 78 lines; of the wings 12-14 lines.

Gen. STRATIOMYS, *Geoffr.*

14. *STRATIOMYS IMMISCENS*, n. s. *Mas*. Nigra, antennis fulvis parvis, scutelli margine postico spinisque pallide flavis, abdomine pallide flavo fasciis tribus dorsalibus latis nigris postice excavatis, pedibus flavescentibus, femoribus tibiisque nigro fasciatis, tarsis nigris, alis limpidis.

Male. Black. Head beneath and thorax with whitish down. Antennæ tawny, short. Scutellum along the hind border and spines pale yellow. Abdomen pale yellow, with three broad black dorsal bands, whose hind borders are much indented. Legs yellowish; femora and tibiæ with black bands; tarsi black. Wings limpid; veins brown; halteres pale. Length of the body 6 lines; of the wings 10 lines.

15. *STRATIOMYS FINALIS*, n. s. *Fæm.* Nigra, aureo-tomentosa, capite

subtus fulvo, antennis fulvis parvis, thorace vittis tribus nigris, thoracis margine postico spinisque pallide flavis, abdomine fulvo, pedibus pallide fulvis, alis limpidis.

Female. Black with gilded tomentum. Head tawny beneath, with two more or less tawny calli above the antennæ, which are tawny and short. Thorax with three black stripes; scutellum with the hind border and the spines pale yellow. Abdomen tawny, paler beneath. Legs pale tawny. Wings limpid; veins tawny; stigma testaceous. Length of the body 4 lines; of the wings 8 lines.

Gen. CLITELLARIA, *Meigen*.

16. CLITELLARIA FESTINANS, D. S. *Mas.* Nigra, aureo-tomentosa, antennis rufescenti-fulvis apices versus nigris, thorace fascia vittisque duabus aureis, scutelli spinis apice rufescenti-fulvis, abdomine vittis tribus macularibus aureis, pedibus luteis, alis luteis postice cinereis apice nigricantibus.

Male. Black, thick, with gilded down. Antennæ nearly as long as the breadth of the head; scape reddish tawny, fusiform, longer than the flagellum, which is black and lanceolate. Thorax and pectus with an interrupted downy band; thorax with two downy stripes, and with two lateral black spines; scutellum with a downy border, and with two stout spines, whose tips are reddish tawny. Abdomen with three rows of downy spots; the middle spots triangular; the lateral spots oblique. Legs and halteres luteous. Wings luteous along the costa, cinereous hindward, where the veins are bordered with black; tips broadly blackish; a black dot adjoining the luteous stigma. Length of the body 6 lines; of the wings 12 lines.

Fem.? Nigra, cinereo-tomentosa, antennis scapo intus fulvo, thoracis vittis duabus abdominisque maculis cinereis, femoribus tibiisque albidis apices versus nigris, tarsis basi albidis, alis obscure cinereis fascia lata subapicali nigricante.

Female? Black. Head shining, with white tomentum about the eyes. Antennæ shorter than the breadth of the head; scape linear, tawny on the inner side, much shorter than the flagellum, which is lanceolate. Thorax with two stripes of cinereous tomentum and with two lateral spines; scutellum with two stout spines; pectus with silvery cinereous tomentum. Abdomen with cinereous tomentose spots, which are disposed in three rows. Femora and tibiæ whitish black towards the tips; tarsi whitish at the base. Wings dark grey, with a broad blackish subapical band; veins and stigma black; halteres whitish. Length of the body 5 lines; of the wings 10 lines.

17. CLITELLARIA GAVISA, N. S. *Mas.* Nigra, albedo-tomentosa, antennis testaceis apices versus nigris, thorace vittis duabus aureis, scutelli spinis apice flavis, abdomine vittis tribus macularibus aureis, pedibus flavis apices versus nigricantibus.

Male. Black, with whitish down. Antennæ shorter than the breadth of the head; scape testaceous, longer than the flagellum, which is

pilose. Thorax with two stripes of gilded tomentum, and with two lateral spines; spines of the scutellum yellow towards their tips. Abdomen with three rows of gilded tomentose spots, the dorsal spots triangular; the lateral spots oblique. Legs yellow; tarsi black towards the tips. Wings cinereous, blackish towards the tips and about the transverse veins; veins black, yellow towards the base; halteres yellow. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Fæm. ? Cinereo-tomentosa, thoracis vittis abdominisque maculis cinereis, pedibus albidis, femoribus tibiisque tarsisque apice nigris alis cinereis, fascia subapicali nigricante.

Female ? With cinereous tomentum. Head white and shining about the eyes. Stripes of the thorax and spots of the abdomen cinereous. Legs whitish; femora, tibiæ and tarsi black towards the tips. Wings cinereous with a blackish subapical band.

Gen. OXYCERA, *Meig.*

18. OXYCERA MANENS, n. s. *Mas et Fæm.* Nigra, cinereo-subtomentosa, antennis fulvis, pedibus pallide fulvescentibus aut lividis, alis vix cinereis. *Mas.* Thorace aureo-subtomentoso.

Male and Female. Black, slightly covered with cinereous tomentum. Head white and shining about the eyes. Antennæ tawny. Thorax of the male slightly covered with gilded tomentum. Legs dull pale tawny or livid; hind tibiæ black. Wings hardly cinereous; veins and stigma pale in the male, black in the female. Length of the body 3 lines; of the wings 7 lines.

Gen. SARGUS, *Fabr.*

19. SARGUS REPENSANS, n. s. *Mas.* Testaceus, pubescens, vertice nigro, palpis lanceolatis, arista nigra, tibiisque tarsisque posticis nigris, his albo cinctis, tarsis anterioribus apice nigris, alis cinereis apices versus nigricantibus.

Allied to *S. AURIFER.*

Male. Testaceous, pubescent. Vertex black. Palpi lanceolate, extending along two-thirds of the space between the mouth and the antennæ; arista black. Hind tibiæ and hind tarsi black, the latter white towards the tips, which are black; anterior tarsi with black tips. Wings cinereous, blackish towards the tips; veins black, testaceous at the base. Length of the body 9 lines; of the wings 20 lines.

20. SARGUS REMEANS, n. s. *Fæm.* Niger, pubescens, thorace purpurascente-nigro, vittis duabus lateralibus pectoris disco tibiisque anterioribus supra sordidè albidis, alis nigricantibus. *Mas.* ? Antennis piceis, thorace purpurascente-cupreo, pectore livido, abdominis segmentis albido-marginatis, alis fuscis, cinereis extus albido-stri-gatis.

Allied to *S. TENEBRIFER.*

Female. Black, pubescent. Head wanting. Thorax purplish black, with a dingy whitish stripe along each side; disk of the pectus dingy whitish. Anterior tibiæ dingy whitish above. Wings blackish; veins black; halteres dingy whitish, with blackish knobs. Length of the body 9 lines; of the wings 20 lines.

Male? Black. Head whitish about the mouth. Antennæ piceous. Thorax purplish cupreous, with a dingy whitish stripe along each side; pectus livid. Abdomen with two lanceolate apical appendages; hind borders of the segments whitish. Wings brownish cinereous, with slight whitish streaks on the exterior areolets. Length of the body 7 lines; of the wings 16 lines.

21. *SARGUS REDHIBENS*, n. s. *Fæm.* Cyaneus, antennis fulvis, thoracis lateribus anticis purpurascens, abdomine purpureo, pedibus albidis, tibiis posticis femoribusque nigricante strigatis, alis cinereis. *Var. β.* Vertice purpureo, thorace viridi.

Female. Blue. Antennæ tawny. Thorax purplish on each side in front. Abdomen purple, much broader than the thorax. Legs whitish; femora with a blackish streak above towards the tips; hind tibiæ with a blackish apical streak. Wings cinereous; veins black; stigma blackish. Halteres tawny. *Var. β.* Vertex purple. Thorax green. Length of the body $3\frac{1}{2}$ –4 lines; of the wings 7–9 lines.

This may be a local variety of *S. metallinus*, but differs from that species by the dark marks on its hind legs, and by the wing-veins being black at the base.

22. *SARGUS MACTANS*, n. s. *Fæm.* Cupreo-viridis, abdomine cupreo, pedibus testaceis, tibiis posticis basi nigris, alis cinereis apices versus obscurioribus.

Female. Cupreous green, with cinereous down. Head wanting. Abdomen cupreous. Legs testaceous; hind tibiæ black for half the length from the base. Wings cinereous, darker from the discal areolet to the tips; veins black; stigma brown; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 10 lines.

23. *SARGUS INACTUS*, n. s. *Mas.* Albido-testaceus, vertice nigro, thoracis disco scutellique apice purpureis, pectore maculis duabus cupreis, alis cinereis.

Male. Whitish testaceous. Vertex black. Disk of the thorax and scutellum towards the tip purple; pectus with a cupreous spot on each side. Wings cinereous; veins black; stigma dark brown; discal areolet shorter than that of the two preceding species. Length of the body 5? lines; of the wings 10 lines.

Gen. *NERNA*, Walk.

24. *NERNA IMPENDENS*, n. s. *Mas et Fæm.* Nigra, cinereo-subtomentosa, antennis tarsis posterioribus halteribusque testaceis, tarssi LINN. PROC.—ZOOLOGY.

anticis tibiisque piceis, alis cinereis apud costam anteriorem nigricantibus.

Male and Female. Black, with very slight cinereous pubescence. Antennæ, posterior tarsi, and halteres testaceous; tibiæ and fore tarsi piceous. Wings cinereous, blackish along the exterior part of the costa; veins and stigma black. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. SOLVA, n. g.

Corpus lineare. *Proboscis* lanceolata. *Palpi* porrecti, lineares, caput non superantes. *Antennæ* lanceolatæ. *Scutellum* inerme. *Abdomen* thorace longius. *Pedes* breviusculi, femoribus posticis incrassatis subserratis. *Alæ* sat angustæ.

Body linear. Head not broader than the thorax. Proboscis lanceolate. Palpi porrect, linear, rounded at the tips, not extending beyond the head. Antennæ lanceolate, shorter than the breadth of the head; joints indistinct. Thorax with a humeral callus and a linear callus on each side. Scutellum unarmed. Abdomen rather longer than the thorax. Legs rather short; hind femora incrassated, minutely serrated beneath; hind tibiæ very slightly curved, applied to the femora. Wings rather narrow; 1st and 2nd cubital veins rather long; length of the discal areolet more than thrice its breadth; 3rd and 4th externo-medial veins connected towards the border; anal and subanal veins connected at some distance from the border.

25. SOLVA INAMÆNA, n. s. *Fæm.* Cinereo-nigra, palpis, thoracis callis, scutello, abdominis lateribus, ventre pedibusque testaceis, antennis testaceis apice nigris, abdominis segmentis testaceo marginatis, alis subcinereis.

Female. Cinereous black. Mouth, palpi, calli of the thorax, scutellum, abdomen beneath and along each side except at the base, legs, and halteres testaceous. Antennæ testaceous except towards the tips. Hind borders of the abdominal segments testaceous. Wings greyish; veins black, testaceous towards the base. Length of the body $2\frac{1}{2}$ –3 lines; of the wings 5–6 lines.

Gen. AMPSALIS, n. g.

Fæm. *Corpus* elongatum, sublineare. *Antennæ* filiformes; flagellum lineare. *Thorax* longi-ellipticus; scutellum hispinosum. *Abdomen* ellipticum, thorace paullo latius non longius. *Pedes* longiusculi. *Alæ* angustæ.

Female. Body elongate, nearly linear. Head a little broader than the thorax. Eyes prominent. Palpi very short. Antennæ filiform, much longer than the breadth of the head; flagellum linear, about twice the length of the scape; joints indistinct. Thorax elongate-elliptical; scutellum armed with two obliquely ascending spines. Abdomen

elliptical, a little broader but not longer than the thorax. Legs rather long. Wings narrow; 1st cubital vein about one-fourth the length of the 2nd; four externo-medial veins complete; subanal vein curved, joining the anal vein at some distance from the border; discal areolet elongated and attenuated exteriorly; exterior side very short.

26. *AMPSALIS GENIATA*, n. s. *Fæm.* Ferrugineo-fusca, antennis nigris basi fulvis, thorace vittis duabus testaceis, scutello testaceo, apice spinisque et pectoris disco nigris, abdomine nigro, basi vittis duabus interruptis lateralibus pedibusque testaceis, alis cinereis apices versus fusciscentibus.

Female. Ferruginous brown. Antennæ black, tawny towards the base. Thorax with two testaceous stripes; scutellum testaceous; tip and spines black. Disk of the pectus black. Abdomen black; base and an interrupted stripe along each side testaceous. Legs and halteres testaceous. Wings grey, brownish in front towards the tips; veins black, testaceous at the base; stigma testaceous. Length of the body 6 lines; of the wings 11 lines.

Gen. TRACANA, n. g.

Mas et Fæm. Corpus elongatum. Proboscis lanceolata. Antennæ graciles, filiformes, capite transverso vix breviores. Thorax longi-ellipticus; scutellum bispinosum. Abdomen thorace paullo longius et latius. Pedes longiusculi. Alæ longæ, non latæ.

Male and Female. Body elongate. Head rather broader than the fore part of the thorax. Mouth lanceolate; palpi very short. Antennæ slender, filiform, about as long as the breadth of the head; 3rd joint long; 4th and following joints shorter. Thorax elongate-elliptical, with a distinct linear callus along each side; scutellum armed with two obliquely ascending spines. Abdomen elongate-elliptical, most attenuated towards the base, a little broader and longer than the thorax. Legs rather long. Wings long, not broad; 1st subcubital vein hardly one-third the length of the 2nd; four externo-medial veins complete; subanal vein curved, joining the anal vein near the border; discal areolet oblong, narrower exteriorly; exterior side very short.

27. *TRACANA ITERABILIS*, n. s. *Mas et Fæm.* Cinereo-nigra, capite antico fulvo, antennis albido-flavis basi nigricantibus, pedibus fulvis, tibiis posticis femoribusque nigro-fuscatis, alis cinereis apices versus nigricantibus. *Mas.* Abdomine fulvo maculis lateralibus nigris. *Fæm.* Abdominis basi lateribusque fulvis.

Male and Female. Cinereous black. Head in front and calli of the thorax tawny. Antennæ whitish yellow, blackish at the base. Legs tawny; femora and hind tibiæ banded with black. Wings grey, blackish towards the tips; veins black; halteres tawny. *Male.* Abdomen tawny, with some black spots on each side. *Female.* Abdomen tawny

at the base and along each side. Length of the body 5 lines; of the wings 10 lines.

Gen. ROSAPHA, n. g.

Mas et Fæm. Corpus angustum, elongatum, lineare. *Antennæ* graciles, filiformes, capite transverso longiores; articulus 3^{us} fusiformis. *Scutellum* spinis duabus longis acutis armatum. *Abdomen* thorace vix longius aut latius. *Pedes* breves. *Alæ* angustæ.

Male and Female. Body narrow, elongated, linear. Mouth and palpi extremely short. *Antennæ* slender, filiform, longer than the breadth of the head; 3rd joint long, fusiform; joints of the flagellum indistinct. Thorax nearly linear, a little narrower in front; scutellum armed with two long, acute, hardly ascending spines. Abdomen subfusiform, narrowest towards the base, very little broader and longer than the thorax. Legs short. Wings narrow; 1st cubital vein nearly half the length of the 2nd; three complete externo-medial veins; subanal vein curved, joining the anal vein at some little distance from the border; discal areolet oblong; exterior side short.

28. ROSAPHA HABILIS, n. s. *Mas et Fæm.* Fulva, capite antennisque nigris, his basi fulvis, thoracis macula antica elongata, spinis apice, tibiis posticis apices versus tarsisque anterioribus nigris, tarsis posticis albis apice nigris, alis cinerascensibus apices versus nigris. *Fæm.* Abdomine supra nigro, basi lateribusque fulvis.

Male and Female. Tawny. Head black, white beneath along the eyes. *Antennæ* black; 1st, 2nd, and 3rd joints tawny. Thorax with an elongated black spot in front; spines of the scutellum black towards the tips. Hind tibiæ towards the tips and anterior tarsi black; hind tarsi white with black tips. Wings greyish, blackish in front towards the tips; veins black, tawny at the base; stigma ferruginous brown. *Female.* Abdomen black above, except at the base and along each side. Length of the body 3½ lines; of the wings 7 lines.

Gen. RUBA, n. g.

Fæm. Corpus breve, crassum, latum. *Caput* parvum. *Antennæ* capite transverso vix breviores. *Scutellum* inerme. *Abdomen* globosum, thorace valde latius. *Pedes* breves. *Alæ* mediocres.

Female. Body thick, short, broad. Head much narrower than the thorax. Proboscis and palpi very short. *Antennæ* nearly as long as the breadth of the head; 3rd joint broader and longer than the flagellum, of which the joints are short, compact, and minutely setulose. Thorax a little longer than broad; scutellum unarmed. Abdomen globose, very much broader and a little longer than the thorax. Legs short. Wings moderately broad; 1st cubital vein not one-third of the length of the 2nd; four complete externo-medial veins; subanal

vein curved, joining the anal vein at some distance from the border ; discal areolet elongated exteriorly, irregularly triangular ; exterior side very short.

29. *RUBA INFLATA*, n. s. *Mas.* Testacea, valde pubescens, capite subtus guttis duabus nigris, alis sub-cinereis apices versus fuscescens, stigmatibus, stigmate flavescente.

Male. Testaceous. Head with a black dot on each side of the mouth. Flagellum of the antennæ black. Thorax and abdomen very pubescent. Wings slightly greyish, brownish towards the tips, and especially so in front ; veins black, testaceous at the base ; stigma yellowish. Length of the body 4 lines ; of the wings 7 lines.

Gen. TINDA, n. g.

Fæm. Corpus longiusculum, depressum. Caput oblongum, margine postico elevato. Antennæ capite transverso vix breviores ; articulus 3^{us} fusiformis ; flagellum compressum, lanceolatum. Scutellum spinosum. Abdomen ellipticum, thorace latius non longius. Pedes breves, graciles. Alæ angustæ.

Female. Body somewhat elongated and depressed. Head somewhat oblong ; eyes nearly contiguous in front, diverging hindward, where there is an elevated margin. Mouth and palpi very short. Antennæ nearly as long as the breadth of the head ; 3rd joint fusiform, fully half the length of the flagellum, which is compressed and lanceolate, and with indistinct joints. Thorax slightly widening hindward ; scutellum with six ? very minute spines. Abdomen elliptical, broader but not longer than the thorax. Legs short, slender. Wings narrow ; 1st cubital vein less than one-third the length of the 2nd ; three complete externo-medial veins ; subanal vein joining the anal vein at some distance from the border ; discal areolet elongated, its exterior side very short.

30. *TINDA MODIFERA*, n. s. *Fæm.* Nigra, antennis basi testaceis, pedibus testaceis, femoribus posterioribus supra obscurioribus, alis cinereis costam versus subnigricantibus.

Female. Black, hardly shining. Antennæ testaceous towards the base. Legs testaceous ; posterior femora somewhat darker above, except towards the base. Wings grey, slightly blackish along most of the costa ; veins black ; halteres testaceous. Length of the body 3 lines ; of the wings 5 lines.

Gen. SARUGA, n. g.

Mas. Corpus contractum, breve, latum, crassum. Vertex gibbosus. Oculi magni. Antennæ brevissimæ ; articulus 3^{us} rotundus ; arista apicalis, gracillima. Thorax gibbosus ; scutellum elevatum, conicum, postice productum. Abdomen transversum, thorace brevius. Pedes breves, graciles, simplices. Alæ breviusculæ.

Male. Body contracted, short, broad, thick. Head almost as broad as the thorax; vertex gibbous; eyes large, bare; mouth extremely short and small; antennæ very short, 3rd joint round; arista apical, very slender, a little longer than the antennæ; thorax gibbous; scutellum very gibbous, forming an upright cone, somewhat gibbous and conical hindward, where it is horizontal; abdomen a little broader than long, much shorter than the thorax; legs short, slender, simple; wings rather short; veins in structure like those of *Oxycera*.

31. *SARUGA CONIFERA*, n. s. *Mas.* Anthracina, antennis pedibusque albido-testaceis, thorace maculis duabus magnis flavo-tomentosis, femoribus nigris, genibus fulvis, alis albidis.

Male. Coal-black; antennæ and legs whitish testaceous; thorax with a large yellow tomentose spot on each side in front of the scutellum; femora black; knees tawny; wings whitish vitreous; veins and stigma whitish testaceous, the former black towards the base. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Fam. TABANIDÆ, *Leach*.

Gen. TABANUS, *Linn*.

32. *TABANUS SUCCURVUS*, n. s. *Fæm.* Nigricanti-fuscus, capite ferrugineo, callo longo lanceolato gracillimo, palpis piceis, antennis nigris, segmentorum abdominalium marginibus posticis subpallidioribus, tibiis subtus rufescenti-piceis, alis obscure cinereis apud venas fuscescentibus.

Female. Blackish brown. Head ferruginous, with a long lanceolate and very slender callus between the nearly contiguous eyes; under side clothed with black hairs. Proboscis black. Palpi piceous. Antennæ black; 3rd joint with a small horn. Hind borders of the abdominal segments slightly paler in the middle. Tibiæ reddish piceous beneath. Wings dark grey, brownish about the veins towards the base; veins black, piceous towards the base; fore branch of the cubital vein simple, nearly straight; halteres ferruginous, with luteous knobs. Length of the body 11 lines; of the wings 22 lines.

33. *TABANUS FACTIOSUS*, n. s. *Fæm.* Nigricanti-fuscus, capite testaceo, callo nigro gracili lanceolato, palpis piceis, thorace cinereo, abdomine rufescenti-piceo, maculis dorsalibus trigonis albidis, segmentorum ventralium marginibus posticis testaceis.

Female. Blackish brown. Head with testaceous tomentum and with a slender lanceolate black callus between the eyes. Proboscis black; palpi piceous. Antennæ with a very small horn. Thorax with cinereous down; pectus paler and more thickly clothed with paler down. Abdomen reddish piceous, with a whitish triangular spot on the hind border of each segment; hind borders of the ventral segments testaceous. Legs piceous; femora black; tibiæ tawny beneath. Wings grey, with a brownish tint in front; veins black, ferruginous towards

the base; fore branch of the cubital vein simple, nearly straight; halteres ferruginous, with whitish-yellow knobs. Length of the body 10 lines; of the wings 22 lines.

34. *TABANUS REDUCENS*, n. s. *Fæm.* Cinereo-niger, capite albido, callo nigro longo clavato, palpis albidis, antennis nigris vix dentatis, thorace vittis quatuor cinereis, abdomine vittis tribus albidis, segmentis ventralibus albido marginatis, tibiis fulvis apice nigris, alis cinereis striga subcostali nigricante, halteribus piceis apice testaceis.

Female. Cinereous black. Head whitish, clothed with white hairs beneath; callus black, long, clavate; palpi whitish; antennæ black, with an extremely small tooth; thorax with four cinereous stripes; pectus cinereous; abdomen with three whitish stripes, the dorsal one much more conspicuous than the lateral pair; hind borders of the ventral segments whitish; tibiæ tawny with black tips. Wings cinereous, with a blackish sub-costal streak; veins black; fore branch of the cubital vein simple, nearly straight; halteres piceous, with luteous knobs. Length of the body 10 lines; of the wings 20 lines.

35. *TABANUS SPOLIATUS*, n. s. *Mas.* Cinereo-niger, albido tomentosus, capite cinereo, palpis testaceis, antennis nigris basi rufescentibus vix dentatis, thoracis lateribus fulvescentibus, abdomine rufescente maculis dorsalibus trigonis albidis, segmentis ventralibus albido marginatis, tibiis rufescentibus nigro lineatis, alis cinereis apud costam fusciscentibus, halteribus albidis.

Allied to *T. UNIVENTRIS* and to *T. INTERNUS*, but distinct.

This may prove to be the male of *T. reducens*, though it is very different in appearance. *Male.* Cinereous black, with whitish tomentum, which is visible when viewed horizontally; head cinereous; palpi testaceous, very short; antennæ black, reddish at the base, with an extremely small tooth; thorax dull-tawny along each side; abdomen reddish, with a small triangular whitish spot on the hind border of each segment; hind borders of the ventral segments whitish; tibiæ reddish with a black line; wings cinereous, brownish along the costa; veins black, ferruginous at the base; fore branch of the cubital vein simple, nearly straight; halteres whitish. Length of the body 9 lines; of the wings 16 lines.

36. *TABANUS IMMIXTUS*, n. s. *Fæm.* Cinereo-niger, capite albido, callo nigro longo angusto sublineari, palpis albidis, antennis nigris basi rufis vix dentatis, abdomine ferrugineo apice nigro maculis trigonis marginibusque posticis testaceis, tibiis fulvis, alis cinereis apud costam subluridis, halteribus testaceis.

Female. Cinereous black; head whitish; callus long, black, slender, nearly linear; palpi whitish; antennæ black, red at the base; tooth extremely small and obtuse; abdomen ferruginous, black towards the tip; each segment with a triangular spot and the hind border testaceous; tibiæ tawny; wings cinereous, slightly lurid along the costa;

veins black, ferruginous at the base; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

37. *TABANUS FLEXILIS*, n. s. *Fæm.* Cinereus, testaceo tomentosus, callo nigro longo gracillimo, palpis testaceis, antennis ochraceis subdentatis apice nigris, abdomine ferrugineo fusco maculis dorsalibus trigonis marginibusque posticis testaceis, tibiis basi fulvis, alis cinereis apud costam subluridis fusco bifasciatis, halteribus testaceis apice albis.

Female. Cinereous, with testaceous tomentum; head with a black, long, extremely slender callus; palpi testaceous; antennæ ochraceous, with black tips and with a very small black tooth; pectus whitish; abdomen ferruginous brown; each segment with a large triangular spot and with the hind border testaceous; tibiæ tawny towards the base; wings cinereous, somewhat lurid along the costa, with two irregular brown bands; 1st band short, discal, 2nd abbreviated hindward; veins black, ferruginous at the base; fore branch of the cubital vein simple, nearly straight; halteres testaceous with white tips. Length of the body 8 lines; of the wings 16 lines.

Gen. *CHRYSOPS*, *Meigen*.

38. *CHRYSOPS FASCIATUS*, *Wied.* See Vol. I. p. 112.

Fam. *ASILIDÆ*, *Leach*.

Subfam. *MYDASITES*, *Walk.*

Gen. *MYDAS*, *Fabr.*

39. *MYDAS BASIFASCIA*, n. s. *Fæm.* Atra, antennis clavatis, abdomine fascia basali flava apice nitente, femoribus tibiisque posticis rufescentibus, alis cinereis apud venas ochraceis.

Female. Deep black; antennæ clavate, a little longer than the breadth of the head; abdomen with a slender yellow band very near the base, shining at the tip; hind femora and hind tibiæ reddish; wings cinereous, ochraceous about the veins, which are also ochraceous. Length of the body 12 lines; of the wings 22 lines.

Subfam. *DASYPOGONITES*, *Walk.*

Gen. *DISCOCEPHALA*, *Macquart*.

40. *DISCOCEPHALA PANDENS*, n. s. *Mas.* Picea, proboscide palpisque nigris, pectore thoracisque lateribus albidis, abdomine subtus pallide cinereo maculis lateralibus nigris, pedibus fulvis, genibus nigris, tarsis piceis, alis fusciscentibus cinereo strigatis et marginatis, halteribus albidis. *Fæm.* Abdomine fulvo, alis cinereis.

Male. Piceous; front facets of the eyes large; proboscis and palpi black; mystax with four bristles; pectus and sides of the thorax whitish; abdomen beneath pale-cinereous, with black shining spots along each side; legs tawny; trochanters and knees black; tarsi piceous; wings

brownish, cinereous along the hind border, and with cinereous streaks in the disks of the areolets; halteres whitish. *Female*. Abdomen and halteres tawny; wings cinereous. Length of the body 4-5 lines; of the wings 10-12 lines.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

41. LAPHRIA CONCLUDENS, n. s. *Fæm.* Aurata, capite pilis flavis, antennis flavis articulo 3^o rufescente fusiformi, thorace vittis tribus nigris, abdomine fulvo lituris duabus fasciaque interrupta fasciisque duabus ventralibus nigris, pedibus fulvis, alis cinereis apud apices nigricantibus, halteribus pallide flavis.

Female. Gilded; head clothed with pale-yellow hairs; mystax with several bristles; proboscis linear, tawny; antennæ yellow; 3rd joint reddish, elongate fusiform; thorax with 3 black stripes, the lateral pair abbreviated; abdomen tawny; 4th and 5th ventral segments with black bands; 4th dorsal segment with a slight black mark on each side; 5th with a widely interrupted black band; legs tawny; wings cinereous, blackish towards the tips; veins black, ferruginous towards the base; halteres pale yellow. Length of the body 11 lines; of the wings 20 lines.

42. LAPHRIA VULCANUS, *Wied.* See Vol. I. p. 10.

43. LAPHRIA TAPHIUS, *Walk. Cat. Dipt.* pt. 2, 380.

Inhabits also the Philippine Islands.

44. LAPHRIA REQUISITA, n. s. *Mas et Fæm.* Viridis, capite aurato, antennarum articulo 3^o longi-fusiformi, femoribus posticis incrassatis, alis nigricantibus basi et apud costam cinereis, halteribus testaceis. *Mas*. Femoribus anterioribus incrassatis, halteribus ex parte nigricantibus. *Fæm.* Abdomine purpurascenti-cyaneo basi viridi.

Male and Female. Green; head gilded in front, with whitish hairs beneath; mystax with a few black bristles; third joint of the antennæ elongate-fusiform; hind femora incrassated. Wings blackish, cinereous near the base and along nearly half the length of the costa; veins black; halteres testaceous. *Male*. Anterior femora incrassated; halteres partly blackish. *Female*. Abdomen purplish blue, green towards the base. Length of the body 7-9 lines; of the wings 14-16 lines.

45. LAPHRIA PARTITA, n. s. *Mas*. Nigra, capite aurato, antennarum articulo 3^o sublineari, thorace lineis tribus cinereis, lateribus ochraceo-pilosis, maculis duabus humeralibus testaceis, abdomine apice cyanescenti-nigro dimidio basali ochraceo-piloso, pedibus aurato-pilosis, femoribus incrassatis, alis nigricantibus dimidio basali fere sublimpido, halteribus testaceis. *Fæm.* Antennarum articulo 3^o longi-fusiformi,

maculis duabus humeralibus albidis, abdomine nigricanti-cupreo, dimidio basali cinereo piloso.

Male. Black; head brightly gilded above, clothed with luteous hairs beneath; mystax with some black bristles; 3rd joint of the antennæ nearly linear, conical at the tip, a little longer than the 1st and the 2nd together; thorax with three slender cinereous lines; sides with ochraceous hairs; two humeral testaceous spots; abdomen bluish-black towards the tip; 1st, 2nd, and 3rd segments with ochraceous hairs; legs with gilded hairs and with black bristles; femora incrassated, especially the hind pair; wings blackish, almost limpid for nearly half the length from the base, which is partly blackish; the blackish part emitting some streaks into the limpid part; veins black; halteres testaceous.

Female. Third joint of the antennæ elongate fusiform; two humeral whitish spots; 1st, 2nd, and 3rd abdominal segments with cinereous hairs; following segments blackish cupreous. Length of the body 7-9 lines; of the wings 14-16 lines.

46. *LAPHRIA COMPLENS*, n. s. *Fæm.* Nigra, capite argenteo, antennarum articulo 3^o fusiformi, thorace strigis duabus anticis obliquis maculisque duabus pectoralibus argenteis, abdomine purpureo maculis duabus argenteis, pedibus purpurascenti-nigris, femoribus non incrassatis, alis nigricantibus, halteribus apice testaceis.

Female. Black; head silvery, with black hairs beneath; mystax with several black bristles; third joint of the antennæ fusiform; thorax with an oblique silvery streak on each side in front; pectus with a silvery spot on each side; abdomen purple, with a silvery spot on each side of the 4th segment; legs purplish-black; femora not incrassated; wings blackish; veins black; discal veinlet and third externo-medial vein nearly forming one straight line; halteres with testaceous knobs. Length of the body 7 lines; of the wings 12 lines.

47. *LAPHRIA DIOCTRIOIDES*, n. s. *Fæm.* Nigra, tenuis, linearis, facie pectoreque argenteis, antennis linearibus, abdomine maculis lateralibus pedibusque fulvis, femoribus posticis nigro fasciatis, tibiis tarsisque posticis nigris, alis cinereis, halteribus pallide flavis.

Female. Black, slender, linear; face silvery; mystax with four black bristles; antennæ slender, linear, nearly as long as the breadth of the head; pectus silvery; abdomen with tawny dots along each side; legs tawny; a black ring on each hind trochanter; hind femora with a black band; hind tibiæ and hind tarsi black, the latter tawny beneath; wings cinereous; veins black; halteres pale yellow. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

48. *TRUPANEA STRENUA*, n. s. *Fæm.* Nigra, robusta, capite fuscescenti-cinereo, pilis subtus flavescenti-cinereis, abdomine fuscescenti-

nigro fascia basali fasciculari alba apice nigro nitente, pedibus crassis, alis fusciscentibus vitta sordide albida, halteribus fulvis.

Female. Black, stout; head brownish cinereous, very thickly clothed beneath with yellowish cinereous hairs; epistoma very prominent; mystax with a few black bristles above and with many yellowish cinereous bristles below; palpi with short black bristles; 3rd joint of the antennæ elongate conical; thorax with black bristles hindward and along each side; pectus cinereous; abdomen brownish black, with a basal band of white tufts; tip black, shining; legs very stout; pulvilli reddish; wings brownish; radial areolet with a dingy whitish stripe; veins black; halteres tawny. Length of the body 11 lines; of the wings 22 lines.

49. *TRUPANEA CALORIFICA*, n. s. *Mas et Fæm.* Ochracea, capite aurato, antennis nigris, thorace vittato, abdomine maculis magnis transversis subquadratis nigris, pedibus rufis crassis, tarsis nigris, alis cinereis vitta sordide albida, halteribus fulvis. *Mas.* Pectore abdomineque cinereis, hujus fasciculo subapicali argenteo. *Fæm.* Pectore testaceo, abdomine fulvo.

Male and Female. Ochraceous; head gilded in front, thickly clothed beneath; epistoma prominent; mystax with numerous gilded bristles and above with a few black bristles; palpi with short black bristles; antennæ black; third joint fusiform; thorax with slender indistinct stripes; abdomen with a large black transverse subquadrate spot on each segment; legs red, very stout; tarsi black; wings cinereous; radial areolet with a dingy whitish stripe; veins black; halteres tawny. *Male.* Head with whitish hairs beneath; pectus and abdomen cinereous, the latter with a silvery-white subapical tuft. *Female.* Head with gilded hairs beneath; pectus testaceous; abdomen tawny. Length of the body 9-11 lines; of the wings 18-20 lines.

Gen. ASILUS, Linn.

50. *ASILUS DETERMINATUS*, n. s. *Mas et Fæm.* Cinereo-niger, capite subaurato, antennis nigris, thorace vittis tribus cinereis, pedibus fulvis robustis, femoribus nigro vittatis, tibiis apice tarsisque nigris, alis fuscis, halteribus testaceis. *Mas.* Abdomine pilis basalibus luteis. *Fæm.* Abdomine pilis basalibus cinereis dimidio apicali stylato.

Male and Female. Cinereous black; head slightly gilded in front, with pale hairs beneath; epistoma not prominent; mystax with many pale, and above with a few black bristles; antennæ black; third joint lanceolate; arista nearly as long as all the preceding joints; thorax with three cinereous stripes, the lateral pair dilated towards the humerus on each side; pectus cinereous; legs tawny, stout; femora striped above with black; tarsi and tips of the tibiæ black; wings brown; veins black; halteres testaceous. *Male.* Abdomen with luteous hairs towards the base. *Female.* Abdomen with cinereous hairs

towards the base ; nearly half the apical part stylate. Length of the body 10-12 lines ; of the wings 18-20 lines.

51. *ASILUS INTRODUCENS*, n. s. *Fæm.* Cinereo-niger, capite aurato, antennis nigris, thorace vittis duabus lateribusque cinereis, abdomine fasciculis quatuor basalibus cinereis dimidio apicali stylato, pedibus nigris robustis rufo variis, alis fusciscentibus, halteribus fulvis. *Mas?* Capite argenteo, abdomine fascia basali fasciculari fasciaque subapicali albidis latis, alis obscure cinereis.

Female. Cinereous black ; head gilded in front, with cinereous hairs beneath ; epistoma slightly prominent ; mystax with several gilded bristles, and above with a few black bristles : antennæ black ; 3rd joint lanceolate, nearly as long as the arista : thorax with two cinereous stripes, which are dilated on each humerus ; sides and pectus cinereous : abdomen with two cinereous tufts on each side at the base ; nearly half the apical part stylate : legs black, stout ; femora red beneath and partly above ; tibiæ with a broad red band : wings brownish, somewhat paler towards the base and about the borders of the posterior areolets ; veins black ; halteres tawny.

Male? Head silvery in front ; mystax with several white, and above with a few black bristles ; abdomen with a broad whitish tufted band at the base, and with a broad whitish subapical band ; wings dark cinereous, partly paler, as in the female. Length of the body 8-12 lines ; of the wings 12-16 lines.

52. *ASILUS AREOLARIS*, n. s. *Mas.* Cinereo-niger, capite aurato, antennis nigris basi fulvis, thorace vittis tribus cinereis, abdomine apice nigro nitente segmentis cinereo marginatis, pedibus fulvis, tarsis posterioribus nigris, alis fusciscenti-cinereis pallido lituratis triente basali albedo, halteribus testaceis. *Fæm?* Antennarum articulo 3° fusiformi, alis fusciscentibus hyalino lituratis.

Male. Cinereous black ; head gilded in front, clothed with black hairs beneath ; epistoma prominent ; mystax with many gilded bristles, and above with a few black bristles ; antennæ black, tawny towards the base ; thorax with three slender cinereous stripes, sides and pectus cinereous ; abdomen black and shining at the tip, hind borders of the segments cinereous ; legs tawny ; posterior tarsi black ; wings brownish cinereous, with paler marks in most of the areolets, white on more than one-third of the length from the base ; veins black, tawny towards base ; halteres testaceous.

Female? Epistoma less prominent ; third joint of the antennæ fusiform, hardly half the length of the arista ; wings brownish ; marginal areolets with a nearly colourless spot in each. Length of the body 10 lines ; of the wings 18 lines.

53. *ASILUS TENUICORNIS*, n. s. *Fæm.* Cinereus, capite argenteo, antennis testaceis parvis, thorace vittis duabus fusciscentibus, abdomine obscure cinereo segmentis testaceo marginatis, pedibus fulvis,

genubus tarsisque nigris, alis cinereis apice obscurioribus, halteribus testaceis.

Female. Cinereous; head silvery white in front; epistoma very slightly prominent; mystax with some white bristles, and above with very few black bristles: antennæ testaceous; 3rd joint conical, much shorter than the 1st joint, and not more than one-fourth of the length of the arista: thorax with two brownish stripes: abdomen dark cinereous; hind borders of the segments testaceous: legs tawny; tarsi, except at the base and knees, black: wings cinereous, dark cinereous towards the tips; veins black, tawny towards the base; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

Gen. OMMATIUS, *Illiger*.

54. OMMATIUS SCITULUS, n. s. *Mas et Fæm.* Fulvus, gracilis, capite cinereo antice albo, antennis nigris basi fulvis, thoracis disco cinereo-nigro, pectore testaceo, abdominis segmentis pallido marginatis, alis cinereis, halteribus testaceis.

Male and Female. Tawny, slender; head cinereous above, white in front; mystax with several white bristles; antennæ black, tawny towards the base. 3rd joint lanceolate, arista not longer than the 3rd joint; disk of the thorax cinereous black; pectus testaceous; hind borders of the abdominal segments pale; tarsi black towards the tips; wings cinereous; veins black, tawny towards the base; halteres testaceous. Length of the body 6-7 lines; of the wings 11-12 lines.

55. OMMATIUS STRICTUS, n. s. *Mas.* Niger, angustus, capite argenteo, pectore albido-cinereo, abdomine fusco maculis trigonis nigris, segmentis albido marginatis, pedibus fulvis, genibus tarsisque nigris, alis subcinereis extus nigricantibus, halteribus testaceis.

Male. Black, narrow; head silvery white in front; mystax with very few white bristles; third joint of the antennæ elongate-conical; arista a little longer than all the preceding joints together; pectus whitish cinereous; abdomen brown, each segment with a black triangular spot and with a whitish hind border; legs tawny; knees and tarsi black, the latter tawny at the base; wings greyish, exterior half blackish; veins black; halteres testaceous. Length of the body 4-4½ lines; of the wings 7-8 lines.

Gen. LEPTOGASTER, *Meigen*.

56. LEPTOGASTER MUNDA, n. s. *Mas.* Cinerea, capite argenteo, proboscide antennisque fulvis, thorace lineis duabus fuscis, abdomine longo gracili apicem versus subdilatato, segmentorum marginibus maculisque quatuor subapicalibus testaceis, pedibus fulvis, femoribus tibiisque posticis nigro fasciatis, alis subcinereis, halteribus testaceis.

Male. Cinereous; head silvery white; proboscis and antennæ tawny; thorax with two brown lines; abdomen long, slender, slightly dilated

towards the tip, hind borders of the segments testaceous, two testaceous spots on each side towards the tip; legs tawny, hind femora and hind tibiæ with a black band on each; wings slightly greyish; veins black, tawny at the base; halteres testaceous. Length of the body 6 lines; of the wings 8 lines.

Fam. LEPTIDÆ, *Westw.*

Gen. LEPTIS, *Fabr.*

57. LEPTIS FERRUGINOSA, *Wied.* See Vol. I. p. 118.

Heliomeia ferruginea, *Dolichall.*

Dr. Dolichall has described this species and several other Diptera in a Zoological Journal published in Java. I am unable to refer to this work, but have adopted the names with which he has ticketed the species in Mr. Wallace's collection.

Heliomeia has the aspect of *Leptis*, but is distinguished by the subanal and anal veins being united before they join the border of the wing, thus agreeing with *Chrysopila*, from which it differs in the shorter third joint of the antennæ, and in the more slender arista.

Gen. SURAGINA, *n. g.*

Fam. *Corpus* lineare. *Caput* thorace vix angustius. *Proboscis* porrecta, compressa, capitis latitudine paullo brevior. *Palpi* lanceolati, porrecti. *Antennæ* brevissimæ; articulus 3^{us} rotundus; arista gracilis, nuda. *Abdomen* subdepressum, thorace non duplo longius, apice obtusum. *Pedes* nudi, inermes, longiusculi, sat graciles. *Alæ* mediocres, areola discali longissima.

Female. Body linear, moderately broad. Head almost as broad as the thorax; vertex and front of equal breadth. Proboscis porrect, compressed, a little shorter than the breadth of the head. Palpi lanceolate, contiguous to the proboscis. Antennæ very short; 3rd joint round; arista slender, bare, longer than the antenna. Thorax a little narrower in front. Abdomen somewhat flat, less than twice the length of the thorax, obtuse at the tip. Legs bare, unarmed, rather long and slender. Wings moderately long and broad; radial vein slightly curved; forks of the cubital vein a little longer than the preceding part; 3rd externo-medial vein inclined beyond the discal areolet towards the 4th, which is straight; subanal and anal veins united close to the border; discal areolet nearly six times longer than broad, its fore side hardly angular.

58. SURAGINA ILLUCENS, *n. s.* *Fam.* Cinereo-nigra, capite argenteo-cinereo supra atro, palpis antennisque nigris, thorace vittis duabus cinereis, abdomine basi cinereo maculis duabus magnis basalibus apiceque testaceis, pedibus nigris, femoribus testaceis nigro cinctis, tibiis intermediis luridis, alis fuscis postice cinereis albo bifasciatis et bistrigatis.

Female. Cinereous black; head silvery grey, deep black above; proboscis, palpi, and antennæ black; thorax with two cinereous stripes; pectus cinereous; abdomen cinereous at the base; two large basal and lateral spots and the tip testaceous; legs black, femora testaceous, anterior femora black towards the base, hind femora with a broad black band, middle tibiæ lurid; wings brown, cinereous along the basal part of the interior border; two white abbreviated bands and two white intermediate streaks; veins black; halteres testaceous, with black knobs. Length of the body 7 lines; of the wings 12 lines.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. THEREVITES, *Walk.*

Gen. THEREVA, *Latr.*

59. *Thereva congrua*, *Walk.* See Vol. II. p. 90.

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

60. *Anthrax Tantalus*, *Fabr. Ent. Syst.* iv. 260. 15.

Inhabits also Hindostan, China, and Java.

61. *Anthrax semiscita*, *Walk.* See Vol. I. p. 118.

62. ANTHRAX PRETENDENS, n. s. *Fœm.* Nigra, fulvo tomentosa, thorace strigis duabus albidis, abdomine fasciis albidis maculisque duabus apicalibus albis, alis subcinereis basi nigris apud costam nigricantibus, halteribus albidis.

Female. Black; head with tawny tomentum in front, cinereous behind and beneath; thorax with tawny hairs in front and on each side, a whitish streak on each side by the base of the wing; abdomen with whitish bands, and with a white spot on each side at the tip, sides with tawny hairs at the base; wings slightly cinereous, black at the base, blackish along nearly half the length of the costa; veins black; radial vein forming a right angle at its base, curved towards its tip; fore branch of the cubital vein deeply curved; externo-medial veins almost straight; subanal and anal veins approximate on the hind border; halteres whitish. Length of the body 6 lines; of the wings 12 lines.

This and the two following species belong to the group of which *A. hottentotta* is the type.

63. ANTHRAX ANTECEDENS, n. s. *Fœm.* Nigra, flavescente pilosa, capite cinereo, abdomine fasciis latè interruptis guttisque duabus apicalibus albis, lateribus anticis albo pilosis, alis hyalinis basi nigricanti-fuscis.

Female. Black; head cinereous in front and beneath; thorax with pale-

yellowish hairs in front and on each side; abdomen with broadly interrupted white bands, a white dot on each side at the tip, sides with white hairs towards the base; wings hyaline, blackish brown at the base; veins black; radial vein curved towards the tip; fore branch of the cubital vein deeply curved; externo-medial veins straight; subanal and anal veins somewhat approximate on the hind border. Length of the body 4 lines; of the wings 8 lines.

64. *ANTHRAX CONGRUA*, n. s. *Mas.* Nigra, albo pilosa, capite abdominisque lateribus nigro pilosis, abdomine fasciis duabus pallidis, alis subcinereis basi et apud costam nigricantibus, litura costali basali argentea.

Male. Black; head and sides of the abdomen clothed with short black hairs; antennæ very short, 3rd joint round; thorax clothed with white hairs in front and along each side; abdomen with two slender pale bands; wings slightly greyish, blackish at the base and along half the length of the costa, which has a silvery mark at its base; veins black; radial vein curved towards its tip; fore branch of the cubital vein deeply curved; externo-medial veins straight; subanal and anal veins somewhat approximate on the hind border. Length of the body 3 lines; of the wings 6 lines.

65. *ANTHRAX DEMONSTRANS*, n. s. *Fæm.* Nigra, flavescente pilosa, capite cinereo, abdomine fascia subinterrupta guttisque duabus apicalibus albis, lateribus nigro pilosis basi luteo pilosis, alis nigricantibus basi et apud costam nigris.

Female. Black; head with cinereous tomentum behind and beneath; thorax with yellowish hairs on each side; abdomen with a white middle band, which is almost interrupted in the middle and slightly dilated on each side, a white dot on each side at the tip; sides with black hairs, and at the base with luteous hairs; wings blackish, black at the base and along the costa; radial vein forming a rounded angle at its base, as deeply curved towards its tip as is the fore branch of the cubital vein, to which it is parallel; 1st and 2nd externo-medial veins undulating, 3rd nearly straight; subanal and anal veins approximate on the hind border. Length of the body 5 lines; of the wings 10 lines.

66. *ANTHRAX PRÆDICANS*, n. s. *Fæm.*; Nigra, nigro pilosa, antennis brevissimis articulo 3° rotundo, pedibus piceis, alis nigricantibus, albido strigatis, apice et apud marginem posticum cinereis.

Female. Black; head and sides of the thorax and of the abdomen clothed with short black hairs; antennæ very short, 3rd joint round; legs piceous; wings blackish, dark grey at the tips and along the hind border; discal, pabrachial, 3rd externo-medial, and anal areolets with whitish streaks; radial vein undulating towards its tip; fore-branch of the cubital vein slightly curved; externo-medial veins straight; subanal and anal veins approximating closely on the hind

border ; hind side of the discal areolet forming a right angle, and emitting thence the stump of a vein. Length of the body $4\frac{1}{2}$ lines ; of the wings 9 lines.

67. *ANTHRAX DEGENEREA*, Walk. See Vol. I. p. 15. *var. Mas et Fem.* Nigra, angusta, fulvo-pilosa, capite cinereo, antennarum articulo 3° conico, pectore subargenteo, abdomine fasciis duabus ventre pedibus halteribusque fulvis, tarsis nigris, alis fuscis, apice marginæque postico cinereis.

Male and Female. Black, narrow, head cinereous ; 3rd joint of the antennæ conical ; arista very short ; thorax with tawny hairs ; pectus silvery cinereous ; abdomen with two lateral tawny stripes, which are broadest in the female ; underside, legs and halteres tawny ; tarsi black ; wings brown, long, narrow, cinereous towards the tips and along the hind border ; radial vein curved towards its tip : fore branch of the cubital vein slightly curved, sharply angular at its base ; externo-medial veins straight ; subanal and anal veins approximate on the hind border. *Male.* Hind femora with black tips ; angle of the fore branch of the cubital vein emitting the stump of a vein.

Var. β. Female. Sides of the abdomen less tawny ; wings dark brown, cinereous at the tips ; fore branch of the cubital vein deeply curved, with its angle emitting the stump of a vein. Length of the body $3\frac{1}{2}$ –5 lines ; of the wings 8–12 lines.

This species is closely allied to *A. fervida*, and, like the two preceding species, approaches the Australian group (sub-g. *Neuria*), which is distinguished by the long wings with contorted veins.

68. *ANTHRAX PROFERENS*, n. s. *Mas.* Atra, angusta, abdominis lateribus basalibus albo-pilosis, alis longis atris apud marginem posticum exteriorem limpidis, puncto discali albo, litura exteriore transversa albida.

Male. Deep black, slender ; head clothed with short black hairs ; antennæ and arista very short ; 3rd joint round ; abdomen with white hairs on each side at the base ; wings long, deep black, limpid along the exterior part of the hind border ; a white point in the discal areolet, and a little transverse whitish mark at the base of the fore branch of the cubital vein ; the latter deeply curved. Length of the body 4 lines ; of the wings 12 lines.

Allied to the group of which *A. hyalacra* is the type.

Gen. SYSTROPUS, Wied.

69. *SYSTROPUS SPHEGOIDES*, n. s. *Mas.* Niger, capite albidio-testaceo, antennis apices versus lanceolatis, thorace strigis quatuor lateribus pallide flavis, abdomine lurido basi et apicem versus nigro, petiolo longissimo, femoribus subtus tibiisque apice luridis, alis nigricante-cinereis, halteribus albidis nigro fasciatis.

Male. Black ; head white behind, whitish testaceous in front about the

eyes; proboscis longer than the breadth of the head, its sheaths diverging and convoluted at the tips; antennæ a little longer than the proboscis, lanceolate towards the tips; thorax with two pale-yellow streaks on each side, one in front, the other behind the wing; abdomen lurid, black at the base, above, and towards the tip, where it is fusiform; its petiole very long and slender; femora beneath and tibiæ towards the tips lurid; wings blackish grey; veins black; halteres whitish, with a black subapical band. Length of the body 7 lines; of the wings 8 lines.

Fam. DOLICHOPIDÆ, *Leach*.

Gen. PSILOPUS, *Meigen*.

70. *PSILOPUS SPECTABILIS*, n. s. *Mas*. Aureo-viridis, capite purpurascente-cyaneo, antice argenteo, antennis testaceis, thorace vittis tribus cupreis, scutello cyaneo, abdominis lateribus cupreis, pedibus flavis, alis albis, costa lituris duabus costalibus lutescentibus, halteribus testaceis.

Male. Bright golden green; head purplish blue, with silvery tomentum in front; antennæ testaceous; arista black, shorter than the thorax; thorax with three bright cupreous stripes; scutellum blue; pectus silvery; abdomen bright cupreous along each side; legs yellow; tarsi black towards the tips; wings white, brown along the costa and on more than one-third of the length from the tips, with the exception of the hind border; the costal brown part including two transverse lutescent marks, beyond which there is a brown band; veins black; fore branch of the præbrachial vein nearly straight; discal transverse vein straight; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

71. *PSILOPUS FILIFER*, n. s. *Mas*. Viridescens-cyaneus, capite pectoreque argenteis, antennis pedibusque nigris, arista longissima, abdomine viridi fasciis nigris, tibiis anterioribus albidis, alis subcinereis. *Fœm*.? Viridis, capite cyaneo, tibiis anterioribus testaceis.

Male. Greenish blue; head and pectus with silvery white tomentum; antennæ black; arista much longer than the body; abdomen green, with a black band on the base of each segment; legs black, long, slender; anterior tibiæ dingy whitish; wings slightly cinereous; veins black; fore branch of the præbrachial vein much curved; discal transverse vein very slightly undulating.

Female? Bright green; head blue, its fore part and the pectus with silvery white tomentum; abdomen with black bands; anterior tibiæ testaceous; discal transverse vein straight. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

72. *PSILOPUS ÆSTIMATUS*, n. s. *Mas*. Viridis, capite pectoreque argenteis, antennis nigris basi testaceis, abdomine fasciis latis nigris, pedibus flavescentibus, femoribus posticis apice tarsisque nigris, alis subcinereis, halteribus testaceis.

Male. Bright green; head in front and pectus silvery white; antennæ black, testaceous at the base; arista about as long as the thorax; abdomen with a broad black band on the base of each segment; legs yellowish, stout; tarsi black; femora paler than the tibiæ; hind femora with black tips; wings greyish; veins black; cubital vein slightly curved; fore branch of the præbrachial vein much curved; discal transverse vein straight; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

73. *PSILOPUS ABRUPTUS*, n. s. *Mas.* Viridis, capite cyaneo, facie pectoreque subargenteis, antennis pedibus halteribusque nigris, abdomine cyanescente-iridi, alis cinereis.

Male. Bright green; head blue; its fore part and the pectus somewhat silvery; antennæ black; arista hardly longer than the thorax; abdomen bluish green; legs black; wings grey; veins black; fore branch of the cubital vein forming a much rounded right angle, from whence it is straight to its tip; discal transverse vein straight, parted by half its length from the border, and by less than its length from the fork of the cubital; halteres black. Length of the body 2 lines; of the wings 4 lines.

Gen. *DOLICHOPUS*, *Latr.*

74. *DOLICHOPUS CINEREUS*, n. s. *Mas.* Cinereus, capite albo, antennis fulvis, pectore albido, abdomine fasciis æneo-nigris, pedibus testaceis, tarsis anterioribus apice nigricantibus, tibiis posticis apice tarsisque posticis nigris, alis cinereis, halteribus testaceis.

Male. Cinereous, not metallic; head white between the eyes; antennæ tawny; 3rd joint elliptical; arista black, much longer than the antennæ; pectus whitish; abdomen with an æneous black band on each segment; legs testaceous, stout; anterior tarsi blackish towards the tips; hind tarsi and tips of hind tibiæ black; wings grey; veins black; præbrachial vein forming a right angle at its flexure, much curved from thence to the border; discal transverse vein slightly bent outwards; halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

75. *DOLICHOPUS PRÆDICANS*, n. s. *Fæm.* Cinereus, capite pectoreque albis, antennis fulvis, thorace vitta apiceque viridibus, abdomine maculis lateralibus albis, pedibus testaceis, femoribus posticis nigro lineatis, alis cinereis basi nigricantibus, halteribus fulvis.

Female. Cinereous; head and pectus white; antennæ tawny: arista black, longer than the antennæ; thorax with a dorsal stripe and the hind part green; abdomen with white spots along each side; legs testaceous, stout; tibiæ beset with black spines; tarsi black towards the tips; hind femora with a black line; wings cinereous, blackish towards the base; veins black; præbrachial vein gently curved outwards at its flexure, straight from thence to the border; discal trans-

verse vein straight; halteres tawny. Length of the body $2\frac{1}{4}$ lines; of the wings 4 lines.

76. *DOLICHOPUS PROVECTUS*, n. s. *Fæm.* Viridis, capite pectoreque argenteis, antennis nigris latiusculis basi testaceis, thorace vittis duabus nigris, abdomine fasciis argenteis, pedibus nigris, robustis spinosis, tibiis testaceis, alis obscure cinereis.

Female. Bright green; head in front and pectus silvery white; antennæ black, rather broad, testaceous towards the base; 3rd joint conical; arista much longer than the antennæ; thorax with a black stripe on each side; abdomen with silvery white bands; legs black, stout, spinose; tibiæ testaceous; wings dark grey; veins black; præbrachial vein forming a very obtuse angle at its flexure, straight from thence to the border; discal transverse vein straight. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

77. *DOLICHOPUS PRÆMISSUS*, n. s. *Mas.* Obscure viridis, capite pectoreque cinereis, antennis nigris, abdomine viridescente-nigro, pedibus nigris vix spinosis, tibiis ferrugineis, alis obscure cinereis, halteribus fulvis.

Male. Approaches the *Psilopi* in some of its characters. Dark green; head in front and pectus cinereous; antennæ black, very small and short; 3rd joint conical; arista as long as the breadth of the head; abdomen greenish black; legs black, hardly spinose or setose; tibiæ ferruginous; wings dark grey; veins black; præbrachial vein hardly bent between the straight discal transverse vein and the border; halteres tawny. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

78. *DOLICHOPUS PROVENIENS*, n. s. *Fæm.* Obscure viridis, capite albo, antennis nigris, thorace vittis duabus pectoreque cinereis, abdomine cyanescente-viridi fasciis cupreis, pedibus nigris, femoribus anterioribus apice tibiisque fulvis, alis nigricantibus, halteribus fulvis.

Female. Dark green; head white in front and about the eyes; antennæ black; 3rd joint round; arista shorter than the breadth of the head; thorax with two cinereous stripes; pectus cinereous; abdomen bluish green, with cupreous bands; legs black; tibiæ and tips of anterior femora tawny; wings blackish; veins black; præbrachial vein quite straight; discal transverse vein straight, parted by twice its length from the end of the subanal vein; halteres tawny. Length of the body 2 lines; of the wings 4 lines.

Gen. *CHRYSOTUS*, *Meigen*.

79. *CHRYSOTUS EXACTUS*, n. s. *Mas.* Obscure viridis, cinereo-tomentosus, antennis pedibusque nigris, abdomine obscure cupreo, tibiis anticis fulvis, alis cinereis.

Male. Dark green, with cinereous tomentum; antennæ black; 3rd joint conical; arista much shorter than the breadth of the head; abdomen dark-cupreous; legs black; fore tibiæ tawny; wings grey;

veins black; præbrachial vein hardly bent exteriorly; discal transverse vein parted by more than four times its length from the end of the subanal vein. Length of the body $1\frac{1}{4}$ line; of the wings 2 lines.

Gen. DIAPHORUS, *Meigen*.

80. DIAPHORUS RESUMENS, *Wlk.* See Vol. 11. p. 93.

Fam. LONCHOPTERIDÆ, *Curtis*.

Gen. CADREMA, n. g.

Mas. *Corpus* breviusculum, sat gracile. *Caput* thorace vix angustius; facies subobliqua. *Antennæ* brevissimæ; arista apicalis, longa, subpubescens. *Abdomen* ovatum, thorace vix longius. *Pedes* posteriores robusti; tibiæ posticæ calcare apicali arcuata. *Alæ* angustæ, lanceolatae.

Male. Body rather short and slender; head nearly as broad as the thorax; face slightly oblique. *Antennæ* extremely short; arista long, apical, minutely pubescent. *Abdomen* oval, hardly longer or broader than the thorax. Posterior legs stout; hind tibiæ with a curved apical spur. Wings narrow, lanceolate; cubital vein and præbrachial vein parallel, the latter ending at the tip of the wing; discal transverse vein straight, ending at full thrice its length from the border and at nearly thrice its length from the præbrachial transverse.

81. CADREMA LONCHOPTEROIDES, n. s. *Mas.* Testacea, antennis luteis, thoracis disco et metathorace nigris, abdomine apicem versus nigricante, alis vitreis macula apicali nigricante.

Male. Testaceous; antennæ luteous; disk of the thorax and metathorax black; abdomen blackish towards the tip; wings vitreous, with a blackish apical spot; veins black, testaceous towards the base. Length of the body $1\frac{3}{4}$ line; of the wings 4 lines.

Fam. PLATYPEZIDÆ, *Haliday*.

Gen. PLATYPEZA, *Meigen*.

82. PLATYPEZA GLAUCESCENS, n. s. *Mas et Fæm.* Piceo-nigra, capite gutta atra, thoracis disco cyanescens-cinereo, abdomine nigro, pedibus halteribusque piceis, tarsis albidis, posticis dilatatis, alis vitreis.

Male and Female. Piceous black; head with a deep black dot in front; disk of the thorax with a bluish-cinereous tinge; abdomen black; legs piceous; tarsi whitish; hind tarsi dilated; wings quite vitreous; veins black; discal transverse vein parted by nearly twice its length from the border, and by more than twice its length from the fork of the præbrachial vein; fore branch of the latter joining the termination of the costal vein at the tip of the wing, close to the end of the cubital vein; halteres piceous. Length of the body $1-1\frac{1}{2}$ line; of the wings $2-2\frac{1}{2}$ lines.

Fam. SIPPHIDÆ, *Leach*.Gen. CERIA, *Fabr*.

83. CERIA LATERALIS, n. s. *Mas*. Nigra, capite vittis guttisque duabus, thorace maculis octo, pectore fasciis duabus, abdomine maculis duabus basalibus fasciisque duabus flavis, antennarum petiolo pedibusque rufis, alis subcinereis, basi costa strigaeque fuscis, halteribus flavis.

Male. Black; head with two yellow stripes in front, and with a yellow dot on each side at the base of the antennæ; petiole of the latter reddish; 3rd joint elongate-fusiform: thorax with three yellow calli on each side; scutellum with two oblique fusiform yellow spots which are united hindward; pectus with a yellow band on each side; abdomen with a slender petiole which is as long as the terminal fusiform part; a yellow spot on each side of the base; hind borders of the 1st and 2nd segments yellow; legs red; tarsi piceous; wings greyish, dark brown at the base, whence a dark brown streak proceeds to the disk; costa dark brown, blackish exteriorly; veins black; halteres yellow. Length of the body 12 lines; of the wings 16 lines.

Gen. MILESIA, *Latr*.

84. MILESIA CONSPICIENDA, n. s. *Mas et Fem*. Nigra, capite flavo maculis duabus nigris, palpis antennisque rufescentibus, thorace vittis fasciis maculisque duabus, scutelli margine abdomineque fasciis tribus flavis, abdomine fasciis tribus chalybeis, pedibus luteis, femoribus nigro vittatis, tarsis nigris apice luteis, alis cinereis apud costam fuscis.

Male and Female. Black; head yellow, with an elongate black spot above the antennæ, and with another above the epistoma; mouth black; palpi and antennæ reddish; thorax with two yellow stripes; each of its sides in front with a large yellow spot, the latter connected with a band across the pectus; two yellow bands, the 1st interrupted; scutellum bordered with yellow; pectus with two yellow bands on each side; abdomen with three yellow bands and with three chalybeous bands; 3rd yellow band slightly interrupted; legs luteous; femora striped beneath with black; tarsi black, with luteous tips; wings grey, brown along the costa; veins black; halteres yellow. *Male*. Abdomen with a subapical interrupted band; 1st band notched on the hind side. *Female*. First abdominal band slightly interrupted. Length of the body 8-9 lines; of the wings 14-16 lines.

Gen. GRAPTOMYZA, *Wied*.

85. GRAPTOMYZA TIBIALIS, *Wlk*. See Vol. II. p. 95.

Fæm? Lutea, crassa, lata, pubescens, vertice et epistomatis linea nigris, thoracis maculis duabus, disco postico, scutelli pectorisque discis cupreo-nigris, abdomine fasciis tribus nigris, femoribus anterioribus tibiisque nigro fasciatis.

Female? Luteous, pubescent, broad, thick; vertex black; epistoma

conical, forked at the tip, with a black line; proboscis longer than the thorax, black towards the base; arista plumose; two large spots on the thorax, its disk hindward, disk of the scutellum and disk of the pectus cupreous black; abdomen highly arched, with three black bands which are produced and slightly interrupted in the middle; apical band very broad; tibiæ and anterior femora with black bands; wings with a luteous stigma. Length of the body 5 lines; of the wings 8 lines.

Gen. ERISTALIS, *Latr.*

86. *Eristalis crassus*, *Fabr. Ent. Syst. IV.* 281, 12.

Inhabits also Hindostan.

87. *Eristalis Æsepus*, *Wlk. Cat. Dipt.* pt. 3, 625.

Inhabits also China.

88. *ERISTALIS BOMBOIDES*, n. s. *Mas.* Ater, capite albo, arista nuda, thorace pubescente fascia cinerea fasciaque chalybeo-nigra, pectore cinereo, abdomine fasciis quatuor chalybeo-nigris, vittis duabus ventralibus latis albidis, tibiis basi flavis, alis nigricante-fuscis cinereo marginatis, halteribus flavis.

Male. Deep black; head with black hairs on the front and with white tomentum in front and behind; arista simple; thorax thickly pubescent, having in front a cinereous band which is tawny on each side, and a chalybeous black hinder band; scutellum chalybeous-black; pectus cinereous; abdomen with four chalybeous-black bands; the 1st widely interrupted; under side with a broad short whitish stripe on each side; hind (and anterior?) tibiæ yellow at the base; wings blackish-brown, cinereous towards the tips and along the hind border; veins black; halteres yellow. Length of the body $5\frac{1}{2}$ lines; of the wings 11 lines.

Gen. HELOPHILUS, *Meigen.*

The two following *Helophili* may be merely varieties of *H. quadrivittatus*.

89. *HELOPHILUS CONSORS*, n. s. *Mas.* Niger, thorace vittis quatuor flavis, scutello luteo, abdomine vittis tribus luteis tribusque chalybeis, tibiis basi luteis, femoribus posticis incrassatis, alis cinereis apud costam fusciscentibus, halteribus flavis.

Male. Black; thorax with four yellow stripes; scutellum luteous; pectus cinereous; abdomen with three luteous bands and with four chalybeous bands; 1st luteous band interrupted, very broad; 3rd and 4th slightly excavated on the hind side; tibiæ luteous towards the base; hind femora incrassated; hind tibiæ curved; wings cinereous, brownish along the costa; veins black; halteres yellow. Length of the body 5 lines; of the wings 9 lines.

90. *HELOPHILUS CONCLUSUS*, n. s. *Mas.* Niger, capite albo, antennis

rufescentibus, arista nuda, thorace vittis quatuor flavis, scutello fulvo, abdomine fasciis quatuor lineaque transversa flavis fasciaque chalybea, pedibus nigro-luteis, tarsis nigris, alis cinereis apud costam subfuscis, halteribus flavis.

Male. Black; head white, with a black callus above the antennæ, which are reddish; arista simple; proboscis black; thorax with 4 yellow stripes; scutellum tawny; pectus with a broad oblique pale yellow band on each side; abdomen with 4 yellow bands; 1st and 2nd bands very broad; 1st interrupted; 2nd interrupted except in front, where there is a yellow transverse line; 3rd and 4th narrow, with a chalybeous band along the hind border of the 3rd; legs luteous, shaded with black; tarsi wholly black; wings grey, slightly brown along the costa; veins black, tawny towards the base; halteres yellow. Length of the body 5 lines; of the wings 9 lines.

Gen. MERODON, *Fabr.*

91. MERODON INTERVENIENS, n. s. *Mas.* Fuscus, flavescens-cinereo tomentosus, capite testaceo, antennis nigris, arista nuda, scutello fulvo, abdomine fasciis septem ventreeque testaceis, pedibus fulvis, femoribus nigro vittatis, femoribus posticis incrassatis, tibiis posticis nigris, alis cinereis litura costali nigricante, halteribus flavis.

Male. Brown; head with short black hairs on the vertex, white behind, pale testaceous, and with a brown stripe in front; proboscis and antennæ black; arista simple; thorax thickly clothed with yellowish cinereous down; scutellum tawny; pectus cinereous; abdomen cylindrical-conical, with seven testaceous bands; under side testaceous; legs tawny; femora striped with black; hind femora incrassated; hind tibiæ curved, black; wings cinereous, with a blackish mark by the middle of the costa; veins black, halteres yellow. Length of the body 6 lines; of the wings 10 lines.

Gen. VOLUCELLA, *Geoff.*

92. VOLUCELLA DECORATA, n. s. *Mas.* Fulva, oculis thoraceque pubescentibus, hujus disco cupreo-nigro, abdomine cupreo-nigro fasciis tribus flavis, pedibus piceo-fulvis, tarsis piceis basi fulvis, alis vitreis, costa lutea extus fusciscente, halteribus apice niveis.

Male. Tawny; epistoma very prominent; eyes pubescent; arista broadly plumose; thorax pubescent; disk cupreous-black; abdomen cupreous-black, with three yellow bands; 1st band basal; legs slightly shaded with piceous; tarsi piceous, tawny at the base; wings vitreous, luteous and exteriorly brownish along the costa; veins tawny, black towards the tips; halteres with snow-white knobs. Length of the body 7 lines; of the wings 14 lines.

Gen. BARYTEROCERA, *Walk.* See Vol. I. p. 123.

93. BARYTEROCERA GIBBULA, n. s. *Fæm.* Cupreo-nigra, capite fla-

vescente vitta cupreo-nigra, antennis fulvis, thoracis lateribus fasciaque flavis, abdominis lateribus fasciis tribus flavis strigisque tribus flavis, pedibus flavis, tibiis posticis femoribusque nigris apice flavis, alis cinereis, litura costali fasciisque duabus exterioribus nigricantibus.

Female. Cupreous black; head in front yellowish with a cupreous-black stripe; antennæ tawny; 3rd joint long, linear, obtuse at the tip; thorax yellow along each side and with a yellow band in front of the scutellum; abdomen yellow along each side and with three yellow bands; 1st band entire; 2nd nearly interrupted; 3rd emitting a lanceolate streak in front and two hindward streaks which extend to the tip; legs yellow; femora and hind tibiæ black with yellow tips; wings cinereous, with a blackish mark by the middle of the costa, and with two exterior slender blackish bands; veins black; halteres yellow. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. EUMERUS, *Meigen*.

94. EUMERUS FIGURANS, n. s. *Fem.* Niger, capite albo vitta cyanea, scutelli margine postico fulvo, abdomine nigro-æneo fasciis duabus albis, 2^a interrupta, tarsis subtus genibusque testaceis, alis subcinereis.

Female. Black, nearly cylindrical; head whitish, with a dark blue stripe on the vertex; antennæ with whitish tomentum; 3rd joint somewhat dilated, rather broader than long; scutellum tawny along the hind border; pectus cinereous; abdomen æneous-black, minutely punctured, with two white bands, placed oblique with regard to the segments, the 2nd interrupted; tarsi beneath and knees testaceous; wings greyish; veins black; cubital vein much contorted; halteres testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 6 lines.

Gen. SYRITTA, *St. Farg.*

95. SYRITTA ILLUCIDA, n. s. *Fem.* Ænea, capite argenteo, vertice nigro punctis duobus ~~nigris~~, antennis pallide rufis, abdomine fasciis duabus latis interruptis testaceis maculisque duabus subapicalibus albis, pedibus testaceis, femoribus tibiisque posticis nigris, his rufo fasciatis, alis subcinereis. albis

Female. Æneous; head silvery white; vertex black, with an elongated white point on each side; antennæ pale red; pectus and sides of the thorax whitish; abdomen with two broad interrupted testaceous bands; apical segment with a white spot on each side at the base; under side testaceous except near the tip; legs testaceous; hind femora and hind tibiæ black, the latter with a red band; wings greyish-vitreous; veins black. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Gen. BACCHA, *Fabr.*

96. BACCHA DISPAR, n. s. *Mas.* Cupreo-nigra, capite chalybeo-nigro vittis duabus flavis, antennis rufis, thorace maculis quatuor luteis, ab-

domine fasciis duabus arcuatis luteis, pedibus rufescentibus, alis subcinereis, costa fasciaque nigricante fuscis, halteribus fulvis. *Fem.* Scutello flavo apud discum nigricante, abdominis petiolo fulvo, fascia 2^a non arcuata, apice chalybeo, pedibus testaceis, posticis nigro fasciatis.

Male. Cupreous black; head chalybeous black, with a yellow stripe on each side in front; antennæ red, very short; 3rd joint conical; arista black, short; thorax with two luteous spots on each side; the 1st pair joining a luteous band on each side of the pectus; abdomen petiolated, clavate, with two much-arched luteous bands; legs reddish; wings slightly cinereous, blackish-brown along the costa, and with an irregular blackish-brown band, which hardly extends to the hind border; veins black; halteres tawny.

Female. Scutellum yellow, with a blackish disk; abdomen much compressed, with a long slender linear tawny petiole; the 2nd yellow band not arched; tip chalybeous; legs testaceous; hind femora slightly banded with black; hind tibiæ black towards the tips. Length of the body $4\frac{1}{2}$ –5 lines; of the wings 8–9 lines.

Gen. SYRPHUS, *Fabr.*

97. *Syrphus consequens*, *Wlk.* See Vol. I. p. 18.

Fam. MUSCIDÆ, *Latr.*

Subfam. TACHINIDÆ, *Walk.*

Gen. NEMORÆA, *Macq.*

98. *NEMORÆA AMPLIFICANS*, n. s. *Fem.* Cinereo-nigra, capite testaceo, frontalibus nigris, palpis fulvis, antennis piceis, thorace vittis quinque nigris, scutello ferrugineo, abdomine piceo fasciis duabus latis interruptis cinereis, alis cinereis basi et apud costam fuscis.

Female. Cinereous black, with black bristles; head testaceous, more cinereous beneath; frontalia black, slightly widening to the face, with a row of bristles along each side; facialia not bristly; epistoma not prominent; palpi tawny; antennæ piceous, not extending to the epistoma; 3rd joint linear, rounded at the tip, full twice the length of the 2nd; arista nearly twice the length of the 3rd, stout for full half its length; thorax with five slender black stripes, thickly beset with long stout bristles; scutellum ferruginous except towards its base; abdomen piceous, setose towards its tip; 2nd and 3rd segments with broad interrupted cinereous bands along their fore borders; legs stout, bristly; wings grey, brown at the base and in front; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is very slightly curved inward to its tip; discal transverse vein straight, excepting a very slight inward bend near its base, parted by rather more than half its length from the border, and from the flexure of the præbrachial; alulæ cinereous-white. Length of the body 8 lines; of the wings 14 lines.

99. *NEMORÆA TENEBROSA*, n. s. *Fæm.* Cinereo-nigra, capite albido, frontalibus nigris, oculis pubescentibus, palpis et antennarum articulo 2° rufescentibus, thorace lineis quinque nigris, scutello rufo, abdomine obscure rufescente tessellis cinereis, femoribus posticis fimbriatis, alis cinereis, basi costa et venarum marginibus obscure fuscis.

Female. Cinereous black, with black bristles; head whitish; frontalia black, slightly widening to the face, with a row of bristles along each side and beyond it; facialia bristly along most of the length; epistoma not prominent; eyes pubescent; palpi reddish; antennæ not nearly reaching the epistoma; 3rd joint linear, slender, obtuse at the tip, much less than twice the length of the 2nd, which is reddish; arista stout for full half its length, much longer than the 3rd joint; thorax with five black lines; scutellum red, black at the base; abdomen dark reddish, slightly tessellated with cinereous; legs black, bristly; hind femora fringed with short black hairs; wings grey, dark brown at the base, along the costa and along the black veins; præbrachial vein forming a right angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein much curved inward near its base, parted by much less than its length from the border and by rather less than its length from the flexure of the præbrachial; alulæ lurid-cinereous. Length of the body 6 lines; of the wings 12 lines.

Gen. *MASICERA*, *Maq.*

100. *MASICERA DOTATA*, n. s. *Fæm.* Cinerea, capite albo, frontalibus atris, oculis nudis, proboscide palpisque fulvis, thorace vittis quatuor nigris, abdomine longi-elliptico fasciis cinereis, alis luridis angustis, dimidio apicali obscure fusco, margine postico cinereo, halteribus testaceis.

Female. Cinereous, beset with numerous long stout black bristles; head white, clothed behind and beneath with white hairs; frontalia deep black, slightly widening towards the face, with stout bristles along each side; facialia without bristles except by the epistoma, which is not prominent; eyes bare; proboscis and palpi tawny; antennæ nearly reaching the epistoma; 3rd joint slightly broader towards the tip, which is rounded, about four times the length of the 2nd; arista stout at the base, very much longer than the 3rd joint; thorax with four black stripes; abdomen elongate-elliptical, its bristles stouter than those of the thorax; a cinereous band along the foreborder of each segment; lips black, stout, bristly; wings lurid, narrow, dark brown on the exterior half, cinereous along the hind border; veins tawny, black exteriorly; præbrachial vein extending rather beyond the slightly acute angle which it forms at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, parted by rather less than its length from the border and from the flexure of the præbrachial; alulæ cinereous; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

101. *MASICERA HORRENS*, n. s. *Fæm.* Albido-cinerea, valde setosa, capite albo, facie obliqua, oculis pubescentibus, thorace vittis quatuor nigris, abdomine subfusiformi spinoso fasciis tribus latis subinterruptis albidis, alis cinereis basi et apud costam subfuscis, alulis albido-cinereis.

Female. Whitish cinereous, thickly beset with long stout black bristles; head white, clothed behind and beneath with white hairs; frontalia deep black, hardly widening towards the face, with bristles along each side and beyond it; face oblique; facialia with bristles along nearly two-thirds of the length; epistoma not prominent; eyes pubescent; palpi black, rather long; antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, full four times the length of the 2nd; arista very much longer than the 3rd joint, stout for more than one-third of its length; thorax with four black stripes; abdomen nearly fusiform, more spinose than bristly, with three broad slightly interrupted whitish bands on the fore borders of the segments; legs black, stout, bristly; wings grey, slightly brown at the base and along the costa; veins black; præbrachial vein forming a somewhat rounded right angle at its flexure, near which it is much curved inward and is thence straight to its tip; discal transverse vein undulating, parted by about its length from the border and by much less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body 7 lines; of the wings 12 lines.

102. *MASICERA IMMERSA*, n. s. *Fæm.* Albido-cinerea, capite argenteo, oculis nudis, palpis, antennis pedibusque nigris, thorace lineis quatuor nigris, abdomine nigro fasciis tribus latis interruptis cinereis, alis cinereis, alulis albido-cinereis albo marginatis.

Female. Whitish cinereous, with a few black bristles; head silvery white, with white hairs behind and beneath; frontalia black, widening towards the face, with a row of bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi black; antennæ not reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista slender, very much longer than the 3rd joint; thorax with four slender black lines; abdomen black, conical, not longer than the thorax, with three broad interrupted cinereous bands along the fore borders of the segments; legs black, stout; wings grey; veins black; præbrachial vein forming a slightly rounded and obtuse angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ whitish cinereous with white borders. Length of the body 4 lines; of the wings 7 lines.

103. *MASICERA PROGNOSTICANS*, n. s. *Fæm.* Cinerea, gracilis, capite albo, abdomine nigro cylindrico fasciis albis, alis cinereis, alulis halteribusque albis.

Female. Cinereous, slender; head white; frontalia deep black, linear, with stout bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi short, slender; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about six times the length of the 2nd; arista rather slender, not much longer than the 3rd joint; abdomen black, cylindrical, very much longer than the thorax, with a white band on the fore border of each segment; wings cinereous; veins black; præbrachial vein forming a slightly rounded and extremely obtuse angle at the flexure, straight from thence to the tip; discal transverse vein straight, parted by about its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ and halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

Gen. EURYGASTER, *Macq.*

104. EURYGASTER RIDIBUNDA, n. s. *Fœm.* Cinerea, capite argenteo, oculis pubescentibus, palpis fulvis clavatis, antennis piceis, thorace lineis quatuor nigris, abdomine nigro fasciis tribus latis albido-cinereis, pedibus nigris, alis subcinereis basi et apud costam subluridis, halteribus fulvis.

Female. Cinereous, with black bristles; head silvery white in front and behind, clothed behind and beneath with white hairs; frontalia deep black, hardly widening towards the epistoma, with a few black bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes pubescent; palpi tawny, clavate; antennæ piceous, almost reaching the epistoma; 3rd joint linear, slightly rounded at the tip, nearly thrice the length of the 2nd; arista slender, very much longer than the 3rd joint; thorax with four black lines; abdomen black, conical, a little broader and longer than the thorax, with three broad whitish-cinereous bands, somewhat spinose towards the tip; legs black, hardly bristly; wings greyish, with a lurid tinge at the base and along part of the costa; veins black, tawny towards the base; præbrachial vein forming a rounded and obtuse angle at its flexure, nearly straight from thence to its tip; discal transverse vein hardly undulating, parted by little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ cinereous; halteres tawny. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

105. EURYGASTER REMITTENS, n. s. *Fœm.* Cinerea, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor nigris, scutello rufo, abdomine nigro fasciis cinereis fere interruptis, segmenti 2ⁱ lateribus rufescentibus, alis cinereis basi fuscescentibus, alulis albidis.

Female. Cinereous, slightly bristly; head white, clothed behind and beneath with white hairs; frontalia deep black, widening towards the face, with a row of bristles along each side and beyond; facialia without

bristles; epistoma not prominent; eyes pubescent; palpi black, short; antennæ almost reaching the epistoma; 3rd joint slightly widening towards the tip, which is rounded; arista slender, very much longer than the 3rd joint; thorax with four black lines; scutellum red, black at the base; abdomen black, conical, somewhat pilose at the tip, hardly broader or longer than the thorax, with cinereous nearly interrupted bands; 2nd segment reddish on each side; legs black, slightly bristly; wings grey, brownish at the base; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is hardly curved inward to its tip; discal transverse vein very slightly undulating, parted by a little more than half its length from the border, and by about half its length from the flexure of the præbrachial; alulæ whitish. Length of the body 5 lines; of the wings 8 lines.

106. *EURYGASTER APTA*, n. s. *Fæm.* Cinerea, capite albo, oculis nudis, palpis, antennis, pedibusque nigris, thorace vittis quatuor indistinctis, abdominis vitta dorsali et segmentorum marginibus posticis nigris, alis cinereis apud costam fusciscentibus, alulis albido-cinereis.

Female. Cinereous, with few bristles; head white; frontalia black, narrow, linear, with a row of bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes bare; palpi black; antennæ almost reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista slender, very much longer than the 4th joint; thorax with four indistinct black stripes; abdomen conical, especially setose towards the tip, very little longer than the thorax; 1st segment, hind borders of the other segments and dorsal stripe black; legs black; wings grey, brownish along the costa; veins black; præbrachial vein forming an obtuse angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body 4 lines; of the wings 7 lines.

107. *EURYGASTER CONGLOMERATA*, n. s. *Fæm.* Cinereo-nigra, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor anticis nigris, thorace postico abdomineque anthracinis, tibiis posticis subfimbriatis, alis cinereis, alulis testaceo-albis.

Female. Cinereous black; head white, with white hairs behind and beneath; frontalia deep black, linear, with a row of bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes pubescent; palpi black; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, six times the length of the 2nd; arista much longer than the 3rd joint, stout to half its length; thorax with four black lines; hind part and abdomen coal black, shining, the latter conical, not longer than the thorax, setose towards the tip; legs black;

hind tibiæ slightly fringed ; wings grey ; veins black ; præbrachial vein forming a hardly obtuse angle at its flexure, almost straight from thence to its tip ; discal transverse vein undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial ; alulæ testaceous white, very large. Length of the body $4\frac{1}{2}$ lines ; of the wings 8 lines.

108. *EURYGASTER PROMINENS*, n. s. *Mas.* Cinereo-nigra, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor indistinctis, abdominis basi vitta dorsali et segmentorum marginibus posticis nigris, scutelli apice rufescente, abdomine segmenti 2ⁱ lateribus subrufescentibus, alis cinereis, alulis albis.

Male. Cinereous black ; head white, with white hairs behind and beneath ; frontalia deep black, widening to the epistoma, with a row of bristles along each side and beyond ; facialia without bristles ; epistoma not prominent ; eyes pubescent ; palpi black ; antennæ extending to the epistoma ; 3rd joint linear, narrow, rounded at the tip, full four times the length of the 2nd ; arista much longer than the 3rd joint, stout to nearly half its length ; thorax with four indistinct black lines ; scutellum reddish towards its tip ; abdomen nearly oval, cinereous, not longer than the thorax ; 1st segment, hind borders of the following segments, and dorsal stripe black ; 2nd segment slightly reddish on each side ; legs black ; wings grey ; veins black ; præbrachial vein forming a right angle at its flexure, near which it is very slightly curved inward, and is thence straight to its tip ; discal transverse vein hardly undulating, parted by much less than its length from the border, and by less than its length from the flexure of the præbrachial ; alulæ white, very large. Length of the body $3\frac{1}{4}$ lines ; of the wings $6\frac{1}{2}$ lines.

109. *EURYGASTER DEDUCENS*, n. s. *Fæm.* Cinerea, capite albo, oculis nudis, palpis, antennis pedibusque nigris, thorace lineis quatuor, abdominis basi fasciisque tribus nigris, scutello rufescente, alis cinereis basi nigris, alulis albis.

Female. Cinereous, bristly, head white, with whitish hairs behind and beneath ; frontalia deep black, widening to the face, with black bristles along each side and beyond ; facialia without bristles, except by the epistoma, which is slightly prominent ; eyes bare ; antennæ reaching the epistoma ; 3rd joint linear, rather broad, slightly rounded at the tip, about four times the length of the 2nd ; arista much longer than the 3rd joint, stout to half its length ; thorax with four black lines ; scutellum reddish ; abdomen conical, not longer than the thorax, black at the base, and with three black bands on the hind borders of the segments ; wings grey, black at the base ; veins black, testaceous at the base, except along the costa ; præbrachial vein forming an obtuse angle at its flexure, slightly curved inward from thence to its tip ; discal transverse vein straight, except a slight curve at its base, parted

by a little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ white. Length of the body $3\frac{3}{4}$ lines; of the wings 7 lines.

110. *EURYGASTER CONTRACTA*, n. s. *Fæm.* Cinerea, brevis, capite albo, palpis, antennis pedibusque nigris, thorace vittis quatuor nigris, abdomine nigro fasciis tribus latis subinterruptis argenteo-cinereis, alis cinereis basi nigris, alulis albis,

Female. Cinereous, short; head white; frontalia deep black, widening slightly towards the face, with stout bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi and legs black; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the second; arista stout for almost one-third of the length; thorax with four black stripes; abdomen black, nearly oval, not longer than the thorax, with three broad slightly interrupted silvery cinereous bands; wings cinereous, blackish at the base; veins black; præbrachial vein forming an obtuse angle at its flexure, nearly straight from thence to its tip; discal transverse vein curved inward towards its base, parted by less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ white. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

111. *EURYGASTER PROGRESSA*, n. s. *Fæm.* Fulva, capite subtus et apud oculos albido, antennis pallide luteis apice fuscis, abdomine maculis tribus dorsalibus nigris, alis cinereis apud costam luridis apice fuscis, halteribus testaceis.

Female. Tawny, with black bristles; head testaceous, whitish about the eyes and beneath; frontalia pale luteous, widening to the epistoma, beset with bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; antennæ pale luteous, almost reaching the epistoma; 3rd joint linear, brownish towards the tip; arista stout to about one-third of the length; abdomen nearly oval, hardly longer or broader than the thorax, with three black dorsal spots; tarsi piceous; wings grey, lurid along the costa, brown towards the tips, except along the hind border; præbrachial vein forming a slightly obtuse angle at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, parted by much less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ and halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

Gen. *METOPTIA*, *Meigen*.

112. *METOPTIA INSPECTANS*, n. s. *Fæm.* Cinerea, capite magno argenteo subconico, facie perobliqua, thorace vittis quatuor, abdominis vitta dorsali et segmentorum marginibus posticis nigris; alis cinereis, alulis albis, halteribus piceis.

Female. Cinereous; head large, silvery, almost conical in front; frontalia black, linear, with a few bristles along each side; face very oblique; facialia without bristles; epistoma not prominent; eyes bare; proboscis and palpi black, very short; antennæ extending to the epistoma, 3rd joint linear, rounded at the tip, full six times the length of the 2nd; arista longer than the 3rd joint; stout to nearly half its length; thorax with four black stripes, the outer pair interrupted; abdomen conical, not longer than the thorax, hind borders of the segments and dorsal stripe black; legs black, rather short and stout; wings grey; veins black; præbrachial vein forming an almost right angle and emitting a branch at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein straight, parted by much less than its length from the border and by very much less than its length from the flexure of the præbrachial; alulæ white; halteres piceous. Length of the body 3 lines; of the wings 5 lines.

113. *METOPIA INSTRUENS*, n. s. *Fæm.* Cinerea, capite subconico argenteo micante, facie perobliqua, palpis antennis pedibusque nigris, thorace vittis quatuor nigris, abdomine e maculis nigris trivittato, alis cinereis.

Female. Cinereous; head brilliant silvery, almost conical; face very oblique; facialia with bristles along each side; epistoma not prominent; eyes bare; palpi and legs black; antennæ reaching the epistoma, 3rd joint linear, rounded at the tip, about six times the length of the 2nd; arista longer than the 3rd, stout to about one-third of its length; thorax with four black stripes; abdomen with three rows of triangular black spots; wings cinereous; veins black; præbrachial vein forming an obtuse angle, and emitting a branch at its flexure, slightly curved inward from thence to its tip; discal transverse vein straight, parted by more than its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 3 lines; of the wings 5 lines.

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

114. *DEXIA BASIFERA*, n. s. *Fæm.* Testaceo-alba, capitis antici lateribus palpisque fulvis, oculis nudis, antennis pallide luteis, thorace vittis quatuor nigris, abdomine fulvo fusiformi maculis trigonis nigris, macula fasciaque testaceis, pedibus nigris longis, femoribus fulvis apice nigris, tibiis ex parte fulvescentibus, alis cinereis apud venas nigrificantibus, fascia basali obliqua alba, alulis albis.

Group of *D. longipes*.

Female. Testaceous white, narrow, bristly; head somewhat prominent; frontalia black, slightly widening towards the epistoma, with a few long stout black bristles on each side; facialia without bristles; epistoma not prominent; sides of the peristoma tawny and slightly pro-

duced; eyes bare; proboscis and palpi tawny, the former geniculated, rather long; antennæ pale luteous, 3rd joint lanceolate, not reaching the epistoma, thrice the length of the second; arista plumose: thorax with two slender deep black stripes and with two exterior broad blackish stripes; scutellum with six black spines: abdomen tawny, fusiform, longer than the thorax, with little black hairs, with several black spines, and with a triangular black spot on the hind border of each segment; 3rd segment with a testaceous spot at the base, 4th with a testaceous basal band: legs long, black; femora tawny, with black tips; tibiæ partly dark tawny: wings cinereous, blackish along the veins, with an oblique white basal band; costa black at the base; veins black, testaceous in the white part; præbrachial vein forming a slightly acute angle and emitting a short stump at its flexure, curved inward from thence to its tip; discal transverse vein undulating, parted by hardly more than half its length from the border, and by less than its length from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings 10 lines.

Mas. Subaurato-cinerea, abdomine testaceo lanceolato longissimo fasciis maculisque trigonis nigris connexis, pedibus anticis longissimis, alis apud costam nigricantibus, venis vix nigricante marginatis.

Male. Pale gilded cinereous, narrow, bristly; frontalia piceous, widening much towards the epistoma, with bristles along each side; sides of the peristoma much produced; thorax with four deep black stripes, the outer pair rather broad; abdomen testaceous, lanceolate, twice the length of the thorax; hind border of each segment with a black band which is connected with a triangular black spot; legs very long, fore legs extremely long; wings blackish along the costa, hardly blackish along the veins; præbrachial vein curved slightly inward near its flexure, almost straight from thence to its tip. Length of the body 8 lines; of the wings 12 lines.

115. *DEXIA INCLUDENS*, n. s. *Fæm.* Atra, capite apud oculos albo, palpis antennis pedibusque nigris, thorace vittis duabus cinereis, abdomine lanceolato fasciis tribus albis late interruptis, pedibus longiusculis, alis nigricanti-cinereis, halteribus testaceis.

Female. Deep black; head cinereous in front, white about the eyes; vertex narrow; frontalia widening to the face, with bristles along each side; facialia without bristles; epistoma not prominent; palpi slender; antennæ reaching the epistoma, 3rd joint narrow, linear, about four times the length of the 2nd; thorax cinereous on each side, and with two cinereous stripes; abdomen lanceolate, setose, nearly twice the length of the thorax, with three widely interrupted white bands; legs rather long; wings blackish grey; veins black; præbrachial vein forming a very obtuse and slightly rounded angle at its flexure, almost straight from thence to its tip; discal transverse vein almost straight, parted by hardly less than its length from the border, and by much more than its length from the flexure of the præbrachial; alulæ

whitish; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

116. *DEXIA PRECEDENS*, n. s. *Fœm.* Cinerea, capite albo lateribus anticis piceis, palpis pedibusque nigris, antennis testaceis, thorace vittis tribus nigris, abdomine basi lateribus fasciaque nigris, punctis laterilibus albis, pedibus longiusculis, alis cinereis, alulis albis.

Female. Cinereous; head white, piceous on each side in front; frontalia deep black, slightly widening to the face, with bristles along each side; facialia without bristles; epistoma not prominent; palpi and legs black; antennæ testaceous, not reaching the epistoma, 3rd joint not thrice the length of the 2nd; thorax with three black stripes, the lateral pair abbreviated hindward; abdomen a little longer than the thorax, black and with white points along each side, black at the base and with a black band on the hind border of the 2nd segment; legs rather long; wings cinereous; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, almost straight from thence to its tip; discal transverse vein nearly straight, parted by less than its length from the border, and by very much more than its length from the flexure of the præbrachial; alulæ white; halteres piceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. *TOROCCA*, n. g.

- Fœm.* *Corpus* gracile, sublineare. *Proboscis* palpique brevissimi. *Antennæ* brevissimæ, arista nuda. *Thorax* brevis. *Abdomen* longissimum, thorace plus duplo longius. *Pedes* longissimi. *Alæ* angustæ.

Female. Body slender, nearly linear. Head as broad as the thorax. Proboscis and palpi very short. Antennæ very short, not nearly extending to the epistoma; 3rd joint linear, rounded at the tip, about twice the length of the 2nd; arista bare, stout towards the base, full twice the length of the 3rd joint. Thorax short. Abdomen very elongate-fusiform, more than twice the length of the thorax. Legs very long. Wings narrow.

117. *TOROCCA ABDOMINALIS*, n. s. *Fœm.* Viridis, capite pectoreque albis, proboscide palpisque fulvis, antennis pedibusque nigris, abdomine fulvo segmentorum marginibus posticis vittaque dorsali nigris, alis nigricanti-cinereis, alulis albido-cinereis.

Female. Green, bristly; head and pectus white; frontalia deep black, widening to the face, with a row of bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; proboscis and palpi tawny; antennæ black; abdomen tawny, with a few spines; hind borders of the segments black; 1st segment black at the base, and with a broad black stripe; legs black; wings blackish cinereous; veins black; præbrachial vein forming an almost right angle, and emitting a short stump at its flexure, nearly straight from thence to its tip; discal transverse vein very undulating, parted by about half its

length from the border, and by much less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body $5\frac{1}{2}$ lines; of the wings 8 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

118. *Sarcophaga invaria*, *Walk.* See Vol. III. p. 103.

119. *Sarcophaga aliena*, *Walk.* See Vol. I. p. 22.

120. SARCOPHAGA MENDAX, n. s. *Mas.* Cinerea, capite albo, palpis antennis pedibusque nigris, thorace vittisque lineisque duabus nigris, abdomine tessellato vittis tribus nigris, vittis lateralibus e strigis lanceolatis, alis cinereis, alulis albis.

Male. Cinereous; head white, clothed behind and beneath with cinereous hairs; frontalia deep black, widening towards the face; palpi and antennæ black; thorax with five black stripes, the exterior pair incomplete, the middle cinereous intervals interlined; abdomen tessellated, with three black stripes, the lateral pair forming lanceolate streaks on the 3rd and 4th segments; legs black, very stout; wings grey; veins black; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence almost straight to its tip; discal transverse vein slightly curved near each end, parted by much less than its length from the border, and from the flexure of the præbrachial; alulæ white. Length of the body 6 lines; of the wings 10 lines.

121. SARCOPHAGA INEXTRICATA, n. s. *Fæm.* Cinerea, capitis lateribus anticis, palpis, antennis pedibusque nigris, thorace vittis tribus lineisque duabus nigris, abdomine fasciis tribus subinterruptis albidis, alis cinereis, alulis albis.

Female. Cinereous; head with black hairs behind and beneath; frontalia black, broad, slightly widening towards the face; a deep black space on each side of the face; palpi black, rather long; antennæ rather short, not nearly reaching the epistoma, 3rd joint slightly plumose; thorax with three black stripes, the two middle cinereous intervals interlined; abdomen with three broad slightly interrupted whitish bands; legs black, very stout; wings grey; veins black, slightly blackish-bordered; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein very slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings $8\frac{1}{2}$ lines.

Subfam. MUSCIDES, *Walk.*

Gen. IDIA, *Meigen.*

122. *Idia australis*, *Walk.* See Vol. III. p. 103.

123. *IDIA PROLATA*, n. s. (Group *Rhyncomya*, *Desvoidy*). *Fæm.* Viridis, sat angusta, capite testaceo frontalibus facie maculisque duabus anticis nigris, antennis halteribusque testaceis, abdomine cyaneo purpureo cupreoque vario fasciis duabus aureo-viridibus, pedibus nigris, alis cinereis basi et apices versus fuscis.

Female. Green, rather narrow, with slight cinereous tomentum; head testaceous, white behind; frontalia and face black and shining, the former linear; a black spot on each side of the peristoma; epistoma rather prominent; eyes bare; antennæ testaceous, not near reaching the epistoma, 3rd joint about thrice the length of the 2nd; abdomen blue, tinged with purple and with cupreous, a little broader than the thorax, with two golden green bands which are widely interrupted above; legs black; wings grey, brown at the base and towards the tips, with the exception of the hind border; veins black; præbrachial vein forming a much rounded and very obtuse angle at its flexure, which is near the border, nearly straight from thence to its tip; discal transverse vein slightly curved outward, parted by much less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ and halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Gen. *MUSCA*, *Linn.*

124. *MUSCA PROSPERA*, n. s. (Gen. *Silbomyia*, *Macq.*). *Fæm.* Auratoviridis, capite argenteo, facie palpis antennis pedibusque nigris, oculis nudis, pectore maculis duabus argenteis, abdomine spinoso, apice purpureo maculis duabus argenteis, alis nigricantibus basi et apud costam nigris, alulis albis. *Var. β.* Thoracis disco cupreo, abdomine subtus cyaneo-purpureo. *Var. γ.* Abdominis disco cupreo, palpis fulvis.

Female. Deep golden green, thickly beset with very stout bristles; head silvery white; vertex green on each side; frontalia piceous, very broad, with long stout bristles on each side; facialia without bristles; face black, deeply keeled, the keel partly white; epistoma slightly prominent; eyes bare; palpi long, subclavate; antennæ almost reaching the epistoma, 3rd joint full four times the length of the 2nd; pectus with a silvery spot on each side; abdomen elongate-oval, a little longer than the thorax, with long stout spines hindward, purple at the tip, where there is a silvery spot on each side; legs black, very stout; wings blackish, black at the base and along part of the costa; veins black; præbrachial vein forming a rounded right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein undulating, parted by more than half its length from the border and by less than half its length from the flexure of the præbrachial; alulæ white. *Var. β.* Disk of the thorax bright cupreous; abdomen blue and purple beneath. *Var. γ.* Like *Var. β*; palpi tawny; disk of the abdomen bright cupreous. Length of the body 7–8 lines; of the wings 12–14 lines.

125. *MUSCA DELECTANS*, n. s. (n. subg. *Isomyia*). *Fæm.* Cuprea, capite cinereo lateribus anticis fulvis, palpis fulvis latiusculis, antennis rufescentibus, scutello aurato, viridi-abdominis fasciis pedibusque nigris, alis cinereis apud costam nigricantibus apud venas posticas subluridis, alulis albido-testaceis, halteribus fulvis.

Female. Bright cupreous, rather long; head cinereous, tawny and somewhat produced on each side of the peristoma; frontalia black, slightly widening towards the face, with a few bristles along each side; facialia without bristles; epistoma somewhat prominent; eyes bare; palpi tawny, rather broad; antennæ reddish, not near reaching the epistoma, 3rd joint about one-third of the length of the 2nd; scutellum mostly golden green; abdomen nearly oval, broader but hardly longer than the thorax, with a black band on the hind border of each segment; legs black; wings grey, blackish along the costa towards the base, slightly lurid along the hinder veins; veins black; præbrachial vein forming a slightly obtuse and rounded angle at its flexure, much curved inward from thence to its tip; discal transverse vein deeply undulating, parted by more than half its length from the border and by much more than half its length from the flexure of the præbrachial; alulæ whitish testaceous; halteres tawny. Length of the body 7 lines; of the wings 12 lines.

126. *MUSCA INGENS*. n. s. (Gen. *Calliphora*, *Desv.*). *Fæm.* Nigricanti-cyanea, valde setosa, capite albo, palpis antennis pedibusque nigris, pectore cinereo, abdomine spinoso fasciis tribus argenteis late interruptis, alis nigricantibus margine postico cinereo, alulis albidis.

Female. Blackish blue, thickly beset with long stout bristles; head white; frontalia deep black, widening in front, with a few bristles on each side; facialia beset with bristles, except towards the frontalia; palpi and antennæ black, the latter reaching the epistoma, 3rd joint six times the length of the 2nd; pectus and sides of the thorax cinereous; abdomen a little longer and broader than the thorax, with spines towards the tip, and with three broadly interrupted silvery bands; legs black; wings blackish, cinereous along the hind border and in the disks of the hinder areolets; veins black; præbrachial vein forming a right and much rounded angle at its flexure, curved inward beyond, and thence nearly straight to its tip; discal transverse vein slightly undulating, parted by less than half its length from the border, and by full half its length from the flexure of the præbrachial; alulæ whitish. Length of the body 9 lines; of the wings 14 lines.

127. *MUSCA PROMITTENS*, n. s. (Gen. *Ochromyia*, *Macq.*). *Mas et Fæm.* Fulva, capite albo, palpis testaceis, tibiis supra tarsisque apice piceis, alis cinereis basi luridis. *Fæm.* Abdomine purpurascenti-cyaneo basi fulvo.

Male and Female. Tawny with black bristles; head white; frontalia

piceous, linear, with a few bristles along each side; facialia without bristles; epistoma rather prominent; eyes bare; palpi testaceous; antennæ almost reaching the epistoma, 3rd joint four times the length of the 2nd; abdomen of the female purplish blue, tawny towards the base, broader but not longer than the thorax; tibiæ above, and tarsi towards the tips, piceous; wings grey, lurid towards the base; veins black, tawny towards the base; præbrachial vein forming a right and much rounded angle at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, long, parted by more than half its length from the border, and by less than its length from the flexure of the præbrachial; alulæ testaceous. Length of the body 4-5 lines; of the wings 8-10 lines.

128. *MUSCA FAVILLACEA*, n. s. (n. subg. *Anisomyia*). *Fæm.* Fulva, longiuscula, capite antice palpisque testaceis, antennis cinereo-fulvis, thorace vittis tribus cinereis, abdomine nigro basi testaceo fasciis tribus argenteo-cinereis, alis cinereis. *Var. β.* Thorace cinereo, abdomine fulvo cinereo-tessellato segmentis nigro marginatis.

Female. Tawny, rather long, with black bristles; head testaceous in front, whitish and with whitish hairs beneath and hindward; frontalia extremely broad, with a cinereous line, beset with six bristles along each side; facialia without bristles; epistoma prominent; eyes bare; palpi testaceous; antennæ greyish tawny, reaching the epistoma, 3rd joint four times the length of the 2nd; thorax with three indistinct cinereous stripes; abdomen black, elongate-oval, a little longer and broader than the thorax, with a testaceous basal band, and with three silvery grey bands which are testaceous beneath, ventral segments wholly testaceous; wings cinereous; veins black, tawny towards the base; præbrachial vein forming a rounded and obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by a little more than half its length from the border, and from the flexure of the præbrachial; alulæ testaceous. *Var. β.* Thorax cinereous; abdomen tawny, tessellated with cinereous, hind borders of the segments black. Length of the body 5-6 lines; of the wings 10-12 lines.

129. *Musca obtrusa*, Walk. See Vol. III. p. 105.

130. *Musca flaviceps*, Macq. See Vol. I. p. 23.

131. *MUSCA SELECTA*, n. s. (Gen. *Lucilia*, Desv.). *Fæm.* Aureo-viridis, longiuscula, capite testaceo, epistomate elevato, palpis fulvis, antennis pallide rufis, thorace vittis tribus cupreis, pedibus nigris, alis nigricanti-cinereis margine postico cinereo, alulis albidis testaceo marginatis, halteribus fulvis.

Female. Bright golden green, rather long; head testaceous, cinereous and with whitish hairs behind and beneath; frontalia deep black, linear, thickly beset with bristles along each side; epistoma prominent; palpi

tawny; antennæ pale red, not near reaching the epistoma, 3rd joint less than thrice the length of the 2nd; thorax with three slender bright cupreous stripes; abdomen wanting; legs black; wings blackish grey, grey along the hind border; veins black; præbrachial vein forming a very obtuse and much rounded angle at its flexure, slightly curved inward between the flexure and the tip; discal transverse vein undulating, parted by more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ whitish, with testaceous borders; halteres tawny. Length of the body 5 lines; of the wings 10 lines.

132. *MUSCA SPERATA*, n. s. (Gen. *Lucilia*, *Desv.*). *Mas.* Aureo-viridis, capite nigro-cinereo, proboscide palpis antennis pedibusque nigris, thoracis disco cupreo, alis cinereis basi et apud costam sub-luridis, alulis obscure cinereis.

Male. Golden green; head cinereous black; eyes bare; proboscis, palpi, and antennæ black, the latter not reaching the epistoma; disk of the thorax bright cupreous; abdomen shorter than the thorax; legs black; wings grey, with a lurid tinge at the base and along part of the costa; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein very slightly curved inward behind the middle, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulæ dark grey. Length of the body 4 lines; of the wings 8 lines.

133. *MUSCA INSCRIBENS*, n. s. (Gen. *Chrysomyia*, *Desv.*). *Fæm.* Aureo-viridis, capite albo, palpis fulvis, antennis piceis, abdomine segmentorum marginibus pedibusque nigris, alis cinereis basi nigricantibus, alulis cinereo-albis.

Female. Deep bright green; head white; frontalia black, linear; palpi tawny; antennæ piceous, nearly reaching the epistoma; abdomen almost as long as the thorax, hind borders of the segments black; legs black; wings grey, blackish at the base; veins black; præbrachial vein forming an obtuse and rounded angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein nearly straight, parted by little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ cinereous with white borders, the upper pair white. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

134. *MUSCA ELECTA*, n. s. (Gen. *Lucilia*, *Desv.*). *Mas et Fæm.* Viridis, capite albo, palpis antennis pedibusque nigris, alis cinereis, alulis albido-cinereis. *Fæm.* Frontis lateribus nigris. *Var. β, Mas.* Aureo-viridis.

Male and Female. Bright green; head white, that of the female black and shining on each side of the broad dull black frontalia; antennæ black, nearly reaching the epistoma; abdomen a little broader and shorter than the thorax; legs black; wings grey; veins black; præ-

brachial vein forming a very obtuse and much-rounded angle at its flexure, almost straight from thence to the border; discal transverse vein slightly curved inward in the middle, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulæ whitish cinereous; lower alulæ of the male dark cinereous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Male, Var. β. Golden-green; the four alulæ dark cinereous.

135. *MUSCA FORTUNATA*, n. s. (Gen. *Chrysomyia*, *Desv.*). *Mas.* Subaurato viridis, capite albo, palpis fulvis, antennis piceis, abdomine segmentorum marginibus posticis cyaneis, pedibus nigris, alis obscure cinereis basi nigricantibus, alulis albidis.

Male. Bright green, slightly gilded; head white; eyes not contiguous; frontalia black, narrow, linear; palpi tawny; antennæ piceous, nearly reaching the epistoma; abdomen not longer than the thorax, hind borders of the segments dark blue; legs black; wings dark grey, blackish at the base; veins black; præbrachial vein forming an obtuse and slightly-rounded angle at its flexure, almost straight from thence to its tip; discal transverse vein hardly undulating, parted by little more than half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ whitish. Length of the body $3-3\frac{1}{2}$ lines; of the wings 6-7 lines.

136. *MUSCA INTRAHENS*, n. s. (Gen. *Lucilia*, *Desv.*). *Fæm.* Cyanescenti-viridis, capite albo, palpis antennis pedibusque nigris, alis cinereis, alulis obscure cinereis, halteribus testaceis.

Female. Bright bluish green; head white; frontalia dull black; palpi, antennæ, and legs black; abdomen not longer than the thorax; legs black; wings grey; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, straight from thence to its tip; discal transverse vein hardly bent inward, parted by more than half its length from the border, and by about its length from the flexure of the præbrachial; alulæ dark cinereous; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

This species very much resembles *M. electa*, but may be distinguished by its narrower body and by some slight differences in the veins of the wings.

137. *MUSCA OPTATA*, n. s. (Gen. *Pyrellia*, *Desv.*). *Mas.* Viridis, capite albido, palpis antennis pedibusque nigris, alis cinereis, alulis cinereis testaceo marginatis.

Male. Bright green; head whitish in front; palpi and antennæ black; abdomen a little broader and shorter than the thorax; legs black; wings cinereous; veins black; præbrachial vein forming a gentle curve at the flexure, straight from thence to the tip; discal transverse vein straight, parted by much more than half its length from the border,

and by about its length from the flexure of the præbrachial; alulæ cinereous, with testaceous borders. Length of the body 3-3½ lines; of the wings 6-7 lines.

138. *MUSCA PROFERENS*, n. s. (Gen. *Pyrellia*, *Desv.*). *Mas.* *Nigricanti-viridis*, palpis antennis pedibusque nigris, alis cinereis, alulis obscure cinereis, halteribus apice pallidis.

Male. Blackish-green, shining; eyes contiguous; palpi and antennæ black, the latter nearly reaching the epistoma; abdomen a little broader and shorter than the thorax; legs black; wings cinereous; veins black; præbrachial vein forming a gentle curve at its flexure, straight from thence to its tip; discal transverse vein straight, parted by more than half its length from the border, and hardly more than its length from the flexure of the præbrachial; alulæ dark cinereous; halteres with pale knobs. Length of the body 3 lines; of the wings 6 lines.

139. *Musca refixa*, *Walk.* See Vol. I. p. 26.

140. *MUSCA GAVISA*, n. s. (n. subg. *Neomyia*). *Fæm.* *Purpurea*, pubescens, capite nigro, facie subobliqua, palpis antennis pedibusque nigris, abdomine lato crasso, alis fusciscenti-cinereis basi nigricantibus, alulis obscurioribus. *Var. β.* *Viridescenti-cyanea*, scutello purpureo.

Female. Brilliant purple; head black, shining, narrower than the thorax; frontalia dull, linear; face slightly oblique; palpi and antennæ black, the latter not reaching the epistoma; thorax and abdomen with thick black pubescence; abdomen very thick, shorter and much broader than the thorax; legs black; wings brownish grey, blackish at the base; veins black; præbrachial vein forming a much-rounded and very oblique curve at its flexure, hardly curved inward from thence to its tip; discal transverse vein hardly undulating, parted by much more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ dark brownish grey. *Var. β.* Bright greenish blue; scutellum purple. Length of the body 5 lines; of the wings 10 lines.

141. *Musca domestica*, *Linn.* See Vol. I. p. 128.

142. *MUSCA CONDUCTENS*, n. s. *Mas.* *Cinerea*, capite albo, palpis antennis pedibusque nigris, thorace vittis duabus latis nigris, abdomine testaceo linea dorsali nigra basi apiceque cinereo-nigris, alis cinereis.

Male. Cinereous; head white; eyes bare; palpi slender, subclavate; antennæ not reaching the epistoma; thorax with two broad black stripes; abdomen dull testaceous, cinereous black at the base and towards the tip, and with a black dorsal line; wings cinereous; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein curved inward, parted by full half its length from the border, and by a little more than its length from the flexure of the præ-

brachial; alulæ cinereous. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

143. *MUSCA XANTHOMELA*, n. s. *Fæm.* Nigra, capite albido, abdomine ochraceo, alis subcinerascentibus, halteribus pallide testaceis.

Female. Black; head whitish about the eyes, which are red and bare; antennæ not reaching the epistoma; abdomen ochraceous, a little shorter than the thorax; wings slightly greyish; veins black, testaceous towards the base; præbrachial vein forming an obtuse angle at the flexure, straight from thence to the border; discal transverse vein straight, parted by less than its length from the border, and by more than its length from the flexure of the præbrachial; halteres pale testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

144. *MUSCA PRÆDICENS*, n. s. (Gen. *Graptomyza*, *Desv.*). *Fæm.* Nigra, capite albido-cinereo, palpis antennis pedibusque nigris, thorace vittis quatuor albido-cinereis, abdomine testaceo maculis nigris, alis cinereis, halteribus testaceis.

Female. Black; head whitish cinereous; frontalia deep black, linear, with bristles along each side; facialia without bristles; epistoma not prominent; proboscis and palpi black; antennæ reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four stripes, metathorax and pectus whitish cinereous; abdomen testaceous; four black spots on each segment excepting the 1st; legs black; wings cinereous; veins black, testaceous towards the base; præbrachial vein forming a curve at its flexure, which is very near the border; discal transverse vein almost straight, parted by little more than half its length from the border, and by more than its length from the flexure of the præbrachial; alulæ and halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

145. *MUSCA COLLECTA*, n. s. *Mas.* Viridis, cinereo tomentosa, capite albo antice testaceo, palpis antennisque fulvis, abdomine testaceo apice viridi linea dorsali nigra, pedibus nigris, tibiis obscure fulvis, alis cinereis, halteribus testaceis.

Male. Green, with cinereous tomentum; head white, testaceous and rather prominent in front; eyes bare, contiguous; epistoma slightly prominent; proboscis black; palpi tawny; antennæ tawny, not near reaching the epistoma, 3rd joint not more than twice the length of the 2nd; arista simple, more than twice the length of the 3rd joint; abdomen testaceous, green towards the tip, with a black dorsal line; legs black; tibiæ dark tawny; wings grey; veins black, testaceous towards the base; præbrachial vein forming a very obtuse and much-rounded angle at its flexure, from whence it is hardly curved inward to its tip; discal transverse vein curved outward, parted by much more than half its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulæ pale cinereous, with testaceous borders; halteres testaceous. Length of the body $2\frac{3}{4}$ lines; of the wings 5 lines.

Subfam. ANTHOMYIDES, *Walk.*Gen. ARICIA, *Macq.*

146. *Aricia significans*, *Walk.* See Vol. III. p. 107.

147. *ARICIA CONTRARIA*, n. s. *Mas et Fæm.* Picea, capite argenteo, palpis pedibusque nigris, antennis testaceis, scutello fulvo, abdomine nigro, alis cinereis basi et apud costam subluridis.

Male and Female. Piceous, head silvery about the eyes; frontalia dull black; palpi and legs black; antennæ testaceous, reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four indistinct cinereous stripes; scutellum tawny; abdomen black, shining, a little broader but not longer than the thorax; wings grey, rather broad, with a lurid tinge towards the base and along the costa; veins black, tawny towards the base; discal transverse vein hardly undulating, or slightly curved inward, parted by much more than its length from the præbrachial, and by much less than its length from the border. Length of the body 3-4 lines; of the wings 6-8 lines.

148. *ARICIA INTEGR*A, n. s. *Mas.* Testaceo-cinerea, capite albo, palpis nigris, antennis testaceis basi nigris, thorace lineis quatuor nigris postice obsoletis, pedibus fulvis, tarsis piceis, alis cinereis apud costam subluridis, halteribus testaceis.

Male. Testaceous-cinereous; head white; frontalia deep black, widening in front; palpi black; antennæ testaceous, black at the base, nearly reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four black lines which are obsolete hindward; abdomen nearly oval, not longer than the thorax; legs tawny; tarsi piceous; wings grey, with a slight lurid tinge towards the costa; veins black; discal transverse vein curved inward towards the base, parted by about its length from the præbrachial transverse, and by much less than its length from the border; alulæ and halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

149. *ARICIA NIGRICOSTA*, n. s. *Mas et Fæm.* Cinerea, capite argenteo, palpis nigris, antennis piceis, thorace vittis quatuor nigris, abdomine maculis quatuor nigris, pedibus fulvis, alis cinereis apud costam subluridis, costa nigra.

Male and Female. Cinereous; head silvery white; palpi black; antennæ piceous, tawny at the base, reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four black stripes; abdomen nearly oval, not longer than the thorax, 2nd and 3rd segments with two black spots on each; legs tawny; tarsi black; wings cinereous, with a lurid tinge along the costa, which is black; veins black, tawny towards the base; discal transverse vein slightly bent inward, parted by about its length from the præbrachial transverse, and by much less than its length from the border. Length of the body 4 lines; of the wings 8 lines.

Gen. SPILOGASTER *Macq.*

150. SPILOGASTER XANTHOCERAS, n. s. *Fæm.* Alba, capite argenteo, palpis pedibusque nigris, antennis pallide testaceis basi nigris, thoracis fascia lata scutelloque nigris, thorace vitta fasciisque duabus nigris, alis cinereis apud costam subluridis.

Female. White; head silvery white; frontalia broad, deep black; proboscis, palpi, and legs black; antennæ pale testaceous, reaching the epistoma, black at the base, 3rd joint about four times the length of the 2nd; thorax with a broad black band; scutellum black; abdomen cinereous, elongate, with a slender black stripe and with two black bands; wings cinereous, with a lurid tinge along the costa; veins black, tawny towards the base; discal transverse vein bent inward towards the base, parted by hardly more than its length from the præbrachial transverse, and by much less than its length from the border; alulæ white. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Gen. ANTHOMYIA, *Meigen.*

151. Anthomyia procellaria, *Walk.* See Vol. III. p. 108.

Gen. LISPE, *Meigen.*

152. LISPE BIMACULATA, n. s. *Fæm.* Nigra, capite atro antice aurato subtus albido, pectore pedibusque cinereis, abdomine vitta cinerea maculis duabus subapicalibus albis, femoribus intermediis basi dilatatis, alis cinereis, halteribus testaceis.

Female. Black; head deep black above, gilded in front, whitish on each side beneath; pectus and legs cinereous; abdomen with a slender cinereous stripe, and with a white spot on each side near the tip; knees pale; middle femora dilated at the base; wings cinereous; veins black, tawny at the base; discal transverse vein parted by less than its length from the border, and by about twice its length from the præbrachial transverse; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

Gen. CÆNOSIA, *Meigen.*

153. CÆNOSIA LUTEICORNIS, *Walk.* (see Vol. III. p. 108). *Fæm.* Cana, capite aurato, frontalibus pedibusque fulvis, palpis albis, antennis pallide luteis, abdomine subtestaceo apice cano maculis quatuor nigris, alis cinerascensibus, halteribus testaceis.

This is probably the female of *C. luteicornis*, though the wings have no trace of an apical spot.

Female. Hoary; head pale gilded, hoary behind and beneath; frontalia tawny, widening slightly in front; palpi white; antennæ pale luteous, reaching the epistoma, 3rd joint linear, rounded at the tip, six times the length of the 2nd; arista plumose to full half its length; abdomen dull testaceous, hoary towards the tip, where it is very bristly

above, 3rd and 4th segments with a black dorsal spot on each, 4th and 5th segments with a black spot on each side; legs tawny; tarsi piceous; wings greyish; veins black, testaceous at the base; discal transverse vein parted by a little less than its length from the border, and by much more than its length from the præbrachial transverse; alulæ pale cinereous; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

154. *CÆNOSIA SIGNATA*, n. s. *Fæm.* Cinereo-fulva, capite antennis pedibus halteribusque testaceis, thoracis vittis quatuor scutelli disco abdominisque vitta nigris, alis cinereis subluridis.

Female. Cinereous-tawny; head testaceous, white about the eyes; antennæ testaceous, not near reaching the epistoma, 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose to the tip; thorax with four black stripes, the outer pair interrupted; disk of the scutellum black; abdomen with a black stripe, which is interrupted on the hind border of each segment; legs testaceous; wings grey with a slight lurid tinge; veins tawny, costal vein black, discal transverse vein parted by little more than half its length from the border, and by about twice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

155. *CÆNOSIA RESPONDENS*, n. s. *Fæm.* Cana, capite apud oculos albo, palpis albidis, antennis halteribusque testaceis, thorace lineis tribus nigris, abdomine subfusiformi e maculis nigris trivittato, pedibus nigris, femoribus apice tibiisque fulvis, alis cinereis, alulis albis.

Female. Hoary; head white about the eyes; frontalia reddish; palpi whitish; antennæ testaceous, 3rd joint long, slender, nearly reaching the epistoma; thorax with three black lines; abdomen nearly fusiform, a little longer than the thorax, with three black spots on each segment, legs black, femora towards the tips and tibiæ tawny; wings grey; discal transverse vein parted by about twice its length from the præbrachial transverse, and by about its length from the border; alulæ white; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. HELOMYZIDES, *Fallen.*

Gen. *XARNUTA*, *Walk.*

156. *Xarnuta leucotelus*, *Walk.* See Vol. I. p. 28.

Gen. *CORDYLURA*, *Fallen.*

157. *CORDYLURA BISIGNATA*, n. s. *Mas.* Nigra, vix nitens, antennis breviusculis, arista pubescente, abdomine cylindrico maculis duabus lateralibus albis, pedibus non spinosis, alis obscure cinereis, alulis albis.

Male. Black, hardly shining; head white behind, testaceous towards the epistoma; antennæ not near reaching the epistoma, 3rd joint

linear, rounded at the tip, full twice the length of the second; arista pubescent; abdomen cylindrical, a little longer than the thorax, with a white spot on each side in the middle; legs unarmed, moderately long; wings dark grey; veins black; discal transverse vein straight, upright, parted by a little less than its length from the border, and by full twice its length from the præbrachial transverse; alulæ white. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Gen. HELOMYZA, *Fallen.*

158. HELOMYZA OBSERVANS, n. s. *Mas.* Fulva, antennarum articulo 3^o conico brevi, arista plumosa, abdomine guttis quatuor dorsalibus nonnullisque ventralibus nigris, segmentis albido marginatis, alis subcinereis.

Male. Tawny, with a few black bristles; antennæ short, 3rd joint conical, less than twice the length of the 2nd; arista plumose; abdomen conical, not longer than the thorax, hind borders of the segments whitish, fourth segment with a black dot, fifth segment with three black dots, some black dots along each side beneath; wings greyish; veins black, testaceous at the base; discal transverse vein straight, upright, parted by full half its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

159. HELOMYZA TRIPUNCTIFERA, n. s. *Fæm.* Fulva, antennarum articulo 3^o conico, arista plumosa, abdomine fasciis pallidis guttaque apicali atra, alis cinereis antice subluridis.

Female. Tawny, with black bristles; head whitish about the eyes; third joint of the antennæ conical, hardly twice the length of the 2nd; arista plumose to the tip; abdomen with a pale band on the hind border of each segment, and with a black apical dot; wings grey, with a lurid tinge in front; veins black; discal transverse vein straight, upright, clouded with brown, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

160. HELOMYZA COPIOSA, n. s. *Fæm.* Cinerea, capite vitta testacea, antennis fulvis brevissimis basi nigris, arista plumosa, thorace maculis plurimis fuscis, scutello fulvo basi nigro, abdomine nigro vitta et segmentorum marginibus posticis fulvis, tibiis fulvo cinctis, alis cinereis nigricante maculatis.

Female. Cinereous; head slightly ferruginous, with a dull testaceous stripe on the front, whitish about the eyes; epistoma not prominent; antennæ tawny, black towards the base, very short, not extending beyond half the length of the face, 3rd joint conical, much longer than the 2nd; arista plumose; thorax with three rows of various brown spots; scutellum tawny, black at the base; pectus with brown spots; abdomen black, oval, not longer than the thorax, with a stripe

and the hind borders of the segments tawny : legs black, short ; tibiæ tawny, black at the base and at the tips : wings grey, slightly lurid in front, with numerous partly confluent blackish spots ; veins black ; discal transverse vein straight, upright, parted by much less than its length from the border, and by about twice its length from the præbrachial transverse ; halteres tawny. Length of the body $2\frac{1}{2}$ lines ; of the wings 4 lines.

Gen. SCIOMYZA, *Fallen.*

161. SCIOMYZA REPLENA, n. s. *Fæm.* Picea, capite ferrugineo lituris albis, antennis pedibus thoracisque vittis quatuor rufescentibus, abdomine nigro fasciis rufescentibus, femoribus nigris, tibiis nigro bifasciatis, alis nigricantibus albido trifasciatis margine postico cinereo.

Female. Piceous ; head with several black bristles, white about the eyes, ferruginous above, with a white transverse line hindward, with a partly black partly white mark on each side, and with an abbreviated whitish streak in the middle ; antennæ reddish, piceous towards the tips, 3rd joint conical, less than twice the length of the 2nd ; arista plumose ; thorax with four reddish stripes, the outer pair incomplete ; abdomen black, with a reddish band on the fore border of each segment ; legs reddish, femora black, tibiæ with two black bands ; wings blackish, with three irregular abbreviated whitish bands, cinereous along the hind border ; veins black ; discal transverse vein straight, upright, parted by less than its length from the border, and by nearly twice its length from the præbrachial transverse ; halteres testaceous. Length of the body $2\frac{3}{4}$ lines ; of the wings 5 lines.

162. SCIOMYZA ? LEUCOMELANA, n. s. *Fæm.* Picea, nitens, subtus alba, capite plano, antennis rufis apice nigris, arista plumosa, abdomine nigro, pedibus halteribusque testaceis, alis nigricantibus acutis.

Female. Piceous, shining ; head flat above, a little narrower than the thorax ; epistoma, sides of the peristoma, under side and disk of the pectus white ; antennæ red, reaching the epistoma, third joint elongate-conical, black towards the tip ; arista plumose ; scutellum large ; abdomen oval, black, hardly longer or broader than the thorax ; legs short, testaceous ; wings blackish, paler along the hind border, rather pointed at the tips ; costa very convex ; veins black, radial vein slightly curved, cubital vein and præbrachial vein converging towards the tip ; discal transverse vein nearly straight and upright, parted by more than its length from the border, and by nearly twice its length from the præbrachial transverse ; halteres testaceous. Length of the body 2 lines ; of the wings 4 lines.

Gen. AMBLADA, n. g.

Fæm. Corpus sat robustum. Caput transversum, thorace vix angustius. Antennæ capitis latitudine breviores ; articulus 3^{us} lanceolatus,

2° longior; arista pubescens. *Abdomen* brevi-ovatum, thorace multo brevius. *Pedes* simplices. *Alæ* mediocres.

Female. Body moderately stout. Head transverse, almost as broad as the thorax, somewhat flat above; proboscis and palpi very short. Antennæ shorter than the breadth of the head; 3rd joint lanceolate, longer than the 2nd; arista pubescent. Abdomen short-oval, much shorter than the thorax. Legs simple, moderately long. Wings of moderate size; veins of the usual structure.

163. *AMBLADA ATOMARIA*, n. s. *Fæm.* Cinerea, capite guttis quatuor fuscis maculisque duabus atris, arista alba filiformi, thorace lineis duabus punctisque plurimis fuscis, abdomine fulvo segmentorum marginibus nigro punctatis, pedibus fulvis, tibiis albidis nigro bifasciatis, alis lurido-cinereis.

Female. Cinereous; head white about the eyes, with two brown dots on each side of the vertex, and with a deep black spot on each side in front; antennæ cinereous-brown; arista white, filiform, seated on the base of the 3rd joint, which it much exceeds in length; thorax with two slender brown lines and with very numerous brown points; abdomen tawny, with black points on the hind borders of the segments; legs tawny; tibiæ dingy whitish, with two black bands on each; wings grey, with a lurid tinge; veins tawny, black by the costa at the base; discal transverse vein straight, upright, parted by less than its length from the border, and by full twice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Gen. *SEPEDON*, *Latr.*

164. *Sepedon Javanensis*, *Desv. Essai Myod.* 677. 2.
Inhabits also Java.

Subfam. *LAUXANIDES*, *Walk.*

Gen. *LONCHÆA*, *Fallen.*

165. *LONCHÆA? PUNCTIPENNIS*. *Fæm.* Nigra, nitens, capite antico argenteo, antennarum articulo 3, longe-conico, arista plumosa, tarsis halteribusque piceis, alis cinereis basi nigris puncto costali nigro.

Female. Black, shining, with several stout bristles; head silvery in front; face flat; antennæ short; third joint elongate-conical, arista very plumose; abdomen oval, convex, a little shorter and narrower than the thorax; tarsi and halteres piceous; wings grey, black at the base, with a black costal point at the tip of the subcostal vein; veins yellowish, black at the base; costal vein black; discal transverse vein straight, upright, parted by less than its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body $2\frac{1}{4}$ lines; of the wings $4\frac{1}{2}$ lines.

166. LONCHŒA? CONSENTANEA, n. s. *Fœm.* Nigra, nitens, arista nuda, abdomine cyanescente-nigro, alis cinereis, halteribus albis.

Female. Black, shining; antennæ black, nearly reaching the epistoma; 3rd joint linear, about thrice the length of the 2nd; arista simple; abdomen bluish black; wings grey; veins black, testaceous at the base; discal transverse vein straight, upright, parted by less than its length from the border and by more than twice its length from the præbrachial transverse; halteres white. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

167. LONCHŒA? ATRATULA, n. s. *Fœm.* Atra, pubescens, antennis epistoma attingentibus, arista plumosa, abdomine subovato, alis nigricantibus.

Female. Deep black, pubescent, not shining; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista plumose; abdomen somewhat oval, a little broader but hardly longer than the thorax; wings blackish; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by about twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Gen. THRESSA, n. g.

Fœm. Corpus breve, crassum. Caput thorace multo latius. Oculi magni. Antennæ epistoma fere attingentes; articulus 3^{us} linearis, 2^o plus duplo longior; arista plumosa. Abdomen subovatum, thorace non longius. Pedes longiusculi. Alæ parvæ.

Female. Body short, thick. Head much broader than the thorax; front wide. Eyes large. Antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumosé. Thorax a little longer than broad; scutellum rather prominent. Abdomen nearly oval, not longer than the thorax. Legs rather short. Wings small; costal vein ending at the tip of the wing; radial vein very near the costa; cubital vein ending at a little in front of the tip; transverse veins much retracted, very short.

168. THRESSA SIGNIFERA, n. s. *Fœm.* Nigra, nitens, capite cyaneo, antennis pedibusque fulvis, thorace strigis duabus lateralibus albis, femoribus nigris, alis hyalinis apud costam nigris, halteribus albis. *Var. β.* Alis apud costam hyalinis macula apicali nigra.

Female. Black, shining; head blue; antennæ tawny; thorax with a white transverse streak on each side; legs tawny; femora black, with tawny tips; wings hyaline, black along the costa; veins black; discal transverse vein parted by four times its length from the border, and by six times its length from the præbrachial transverse; halteres white. *Var. β.* Wings not black along the costa, with the exception of a black apical spot. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

Gen. OCHTHIPHILA, *Fallen.*

169. OCHTHIPHILA DISCOGLAUCA, n. s. *Fæm.* Fusca, capite thoracisque disco glucescente-albidis, arista plumosa, thorace lineis duabus lateralibus albidis, abdomine lineis transversis vittaque albidis, tibiis tarsisque rufescentibus, alis cinereis, halteribus testaceis.

Female. Brown; head glaucous-whitish; antennæ black, nearly reaching the epistoma; third joint conical, arista plumose; thorax with a very broad glaucous-whitish stripe, a whitish line on each side and two on each side of the pectus; abdomen oval, a little shorter than the thorax, with a whitish band on the hind border of each segment and with a whitish stripe, the whitish hue appearing tawny in some aspects; tibiæ and tarsi reddish; wings grey; veins black; discal transverse vein straight, upright, parted by much less than its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 2 lines; of the wings 4 lines.

Gen. CELYPHUS, *Dalman.*

170. Celyphus obtectus, *Dalman.* See Vol. I. p. 30.

171. Celyphus scutatus, *Wied.* See Vol. I. p. 131.

Subfam. ORTALIDES, *Haliday.*Gen. LAMPROGASTER, *Macq.*

172. Lamprogaster marginifera, *Walk.* See Vol. II. p. 111.

Gen. PTEROGENIA *Bigot, MSS.*

Mas et Fæm. *Platystomati* affinis. *Corpus* breve, latum, crassum. *Caput* thorace latius, antice planum, genis dilatatis. *Antennæ* parvæ; articulus 3^{us} longi-conicus; arista plumosa. *Thorax* subconvexus; scutellum magnum. *Abdomen* thorace brevius et angustius. *Pedes* breves, validi; tibiæ arcuatæ. *Alæ* sat parvæ; alulæ maximæ. *Mas.* Genæ angulatæ, valde dilatatæ.

This genus is allied to *Platystoma*, and more especially to *Trigonosoma*.

Male and Female. Body short, broad, thick. Head broader than the thorax, flat in front; vertex broad; sides of the face or genæ dilated; epistoma rather prominent. Eyes oblong. Antennæ small, resting in the cavity of the broad face; 3rd joint elongate-conical, more than twice the length of the 2nd; arista plumose. Thorax compact, slightly convex; scutellum large, conical. Abdomen short, conical, shorter and narrower than the thorax. Legs short, stout; tibiæ curved, especially the hind pair. Wings rather small; alulæ very large. *Male.* Sides of the face more dilated than those of the female, and forming an angle or short horn on each side.

173. PTEROGENIA SINGULARIS, *Bigot, MSS.* *Mas et Fæm.* Nigra, nitens, capite flavescente-albo fasciis quatuor nigris, antennis pallide

luteis basi nigris, abdominis segmentis flavo marginatis, tarsis albis apice nigris, alis subcinereis dimidio basali lutescente fasciis contiguis fuscis, fascia strigisque exterioribus fuscis, halteribus fulvis.

Male and Female. Black, shining. Head yellowish-white, with four black bands; 1st band on the vertex, broader than the others; 2nd across the base of the antennæ; 3rd in front of the face; 4th on the epistoma; antennæ pale luteous, black at the base; hind borders of the abdominal segments yellow; sides dark tawny towards the base; legs pubescent; tarsi white, with black tips; wings slightly cinereous; basal half somewhat luteous, with several partly confluent brown bands, exterior part with one brown band and with several transverse brown streaks; veins black, pale luteous exteriorly; discal transverse vein slightly curved outward, parted by about one-third of its length from the border, and by more than its length from the præbrachial transverse; alulæ white; halteres tawny. Length of the body 3 lines; of the wings 7 lines.

Gen. PLATYSTOMA, Latr.

174. PLATYSTOMA ATOMARIUM, n. s. *Mas.* Cinereum, nigro pulverosum, facie alba nigro biguttata, antennis pedibusque nigris, arista plumosa, pectore albido, alis nigricantibus guttis plurimis limpidis.

Male. Cinereous; head flat above, white about the eyes; face white, with a black dot on each side in front; antennæ black, nearly extending to the peristoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose; thorax with numerous lines of minute black points; pectus whitish, with black points; abdomen oval, powdered with black, not longer than the thorax; legs short, stout, black; wings blackish, covered with limpid dots, excepting a narrow oblique band on the transverse veins; veins black; discal transverse vein straight, upright, parted by less than half its length from the border, and by a little more than half its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

175. PLATYSTOMA BASALE, n. s. *Fæm.* Cinerea, capite lineis tribus albidis, antennis basi nigris, arista plumosa, thorace vittis indistinctis fuscis maculisque lateralibus nigris testaceo-marginatis, scutello nigro vitta cinerea, abdominis segmentis albido-marginatis, femoribus anticis tibiisque albido fasciatis, alis subcinereis lituris transversis fascia exteriore costam versus dilatata fasciaque subapicali nigricantibus, halteribus albis.

Female. Cinereous; head white about the eyes and beneath, and with three whitish lines on the front; epistoma not prominent; proboscis large; antennæ black towards the base, not near reaching the epistoma; 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose; thorax with indistinct brown stripes, and on each side

with black shining testaceous-bordered spots; scutellum black, shining, with a cinereous stripe; abdomen cinereous-black, oval, tawny on each side at the base, a little shorter and narrower than the thorax; hind borders of the segments whitish; legs black; tibiæ and fore femora with a whitish band on each; wings slightly greyish, with several irregular transverse blackish marks near the base, with a broad exterior blackish band, which is dilated and contains a whitish streak towards the costa, and with an irregular subapical blackish band; veins black; discal transverse vein nearly straight and upright, parted by more than half its length from the border, and by nearly twice its length from the præbrachial transverse; halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

Gen. DACUS, *Fabr.*

176. DACUS DIVERGENS, n. s. *Mas.* Purpureus, longus, angustus; fronte tumida, facie carinata fulvo maculata, palpis fulvis, antennis piceis, arista alba subpubescente, thorace vittis tribus cinereis, abdomine fusiformi apicem versus cylindrico et cyaneo, pedibus piceo-nigris, femoribus fulvis, tarsis posticis rufescentibus, alis cinereis apices versus et apud venas transversas fuscis, halteribus albido-flavis.

Male. Bluish purple, long, slender; head whitish about the eyes; front tumid, convex; face keeled, with a large elongated tawny spot; palpi tawny; antennæ piceous, reaching the epistoma, tawny at the base; 3rd joint linear, conical at the tip, six times the length of the 2nd; arista white, minutely pubescent, very much longer than the 3rd joint; thorax slightly compressed, with three cinereous stripes; pectus cinereous; abdomen fusiform, cylindrical, and mostly blue towards the tip, very much longer than the thorax; legs piceous black; femora tawny; hind tarsi reddish except at the tips; wings cinereous, brown on the fore part towards the tips and about the transverse veins, the brown part including a curved cinereous streak between the cubital and præbrachial veins; veins black; præbrachial vein very slightly undulating; discal transverse vein curved outward, parted by one-fourth of its length from the border, and by much more than its length from the oblique præbrachial transverse; halteres whitish yellow. Length of the body 7 lines; of the wings 12 lines.

The genus *Dacus* includes many distinct forms, and will probably be soon divided into numerous subgenera; the characters of the preceding species differ much from those of the type, *D. Oleæ*. Some of the following species may belong to *Senopterina*, Macq.

177. DACUS ADDENS, n. s. *Fæm.* Cyaneus, longus, angustus, capite nigro, facie plana perobliqua, arista cinerea nuda, thorace vittis tribus cinereis, abdomine æneo-viridi, tibiis tarsis halteribusque nigris, alis cinereis apud costam et apud venam transversam discalem nigricantibus.

Female. Blue, long, narrow; head black, depressed above, white about the eyes; face very oblique, forming before the front a protuberance on which the antennæ are seated, its fore part oblong quadrate, almost flat, with whitish furrows for the antennæ; palpi and antennæ black, the latter reaching the epistoma; 3rd joint linear, rather obtuse at the tip, six times the length of the 2nd; arista cinereous, bare, hardly longer than the 3rd joint; thorax with three indistinct cinereous stripes; abdomen æneous-green, nearly linear, slightly compressed, much longer than the thorax; oviduct protuberant, slender; legs short, stout; tibiæ and tarsi black; wings grey, blackish along the costa and about the transverse veins; veins and halteres black; discal transverse vein straight, upright, parted by full one-fourth of its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 6 lines; of the wings 12 lines.

178. *DACUS BILINEATUS*, n. s. *Fæm.* Fulvus, longiusculus, nigro bivittatus, capite antennisque rufescentibus, arista plumosa, palpis porrectis; pedibus breviusculis nigro fasciatis, alis cinereis, costa venaque transversa discali fusco nebulosis, halteribus testaceis.

Female. Tawny, rather long; head reddish in front; epistoma rather prominent; palpi porrect; antennæ reddish, nearly reaching the epistoma; 3rd joint linear, rounded at the tip, about thrice the length of the 2nd; arista somewhat plumose; thorax elongate-elliptical, with two black stripes; abdomen lanceolate, shining, with two broad black stripes, longer than the thorax; legs rather short, with diffuse black bands; wings grey, brownish along the costa and about the discal transverse vein; veins black, tawny at the base; discal transverse vein nearly straight and upright, parted by one-fourth of its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

179. *DACUS IMITANS*, n. s. *Fæm.* Cyaneus, angustus, capite atro, antennis pedibusque nigris, tarsis posticis basi albidis, alis cinereis, costa vittaque nigris, halteribus piceis.

This species is closely allied to *D. longivitta*, and *D. exigens* and *D. contrahens* belong to the same group,

Female. Dark blue, narrow, with slight cinereous tomentum; head deep black above, white about the eyes; peristoma very prominent; proboscis large; antennæ black, nearly reaching the epistoma; 3rd joint linear, conical at the tip, about four times the length of the 2nd; arista bare, slender; abdomen fusiform, narrower and a little longer than the thorax; oviduct protuberant, slender; legs black, moderately long; first joint of the hind tarsi whitish above; wings cinereous, black along most of the costa to the tips, and black on the space between the cubital and præbrachial veins as far as the præbrachial transverse vein; discal transverse vein straight, upright, parted by

less than half its length from the border, and by very much more than its length from the præbrachial transverse ; halteres piceous. Length of the body $3\frac{1}{2}$ lines ; of the wings 6 lines.

180. *DACUS EXIGENS*, n. s. *Mas*. Viridescens cyaneus, angustus, capite rufescente piceo, antennis luteis, arista nuda, thorace vittis tribus cinereis, pedibus fulvis, alis cinereis striga costali apiceque fuscis, halteribus testaceis.

Male. Greenish blue, narrow ; head reddish, piceous above, white about the eyes, black in front ; antennæ luteous, reaching the epistoma ; 3rd joint slightly lanceolate, full four times the length of the 2nd ; arista slender, simple ; thorax with three cinereous stripes ; abdomen almost cylindrical, much longer than the thorax ; legs tawny ; tarsi black towards the tips ; wings grey, brown at the tips and with a brown streak on the middle of the costa ; veins black, tawny towards the base ; discal transverse vein straight, upright, clouded with brown, parted by less than half its length from the border, and by much more than its length from the præbrachial transverse ; halteres testaceous. Length of the body $3\frac{1}{4}$ lines ; of the wings $5\frac{1}{2}$ lines.

181. *DACUS CONTRAHENS*, n. s. *Fæm*. Cyaneus, angustus, capite supra atro apud oculos albo, antennis luteis, thorace vittis tribus cinereis, pedibus piceis, alis cinereis vitta costali interrupta nigricante, vena transversa discali nigricante nebulosa, halteribus albidis.

Female. Dark blue, narrow ; head deep black above, white about the eyes, piceous in front ; antennæ luteous, reaching the epistoma ; 3rd joint linear, conical at the tip, about six times the length of the 2nd ; arista slender, simple ; thorax with three cinereous stripes ; abdomen compressed, a little longer than the thorax ; legs piceous ; wings grey, with a blackish interrupted costal stripe, which is dilated at the tip of the wing ; veins black ; discal transverse vein clouded with blackish, parted by half its length from the border, and by a little more than its length from the præbrachial transverse ; halteres whitish. Length of the body 3 lines ; of the wings 5 lines.

182. *DACUS INAPTUS*, n. s. *Mas et Fæm*. Viridis, capite atro, facie fulva basi alba, antennis piceis, pedibus halteribusque nigris, alis angustis cinereis.

Male and Female. Green, with slight cinereous tomentum ; head deep black, white about the eyes ; face tawny, white at the base ; antennæ piceous, reaching the epistoma ; 3rd joint lanceolate, full four times the length of the 2nd ; arista bare, long, slender ; thorax long, slightly compressed ; abdomen slightly compressed at the base, linear, narrower and a little shorter than the thorax in the male, fusiform and much attenuated towards the tip in the female ; legs black, moderately long ; wings narrow, cinereous ; veins black, straight ; discal transverse vein straight, upright, parted by less than half its length from the border, and by almost twice its length from the præbrachial trans-

verse; halteres black. Length of the body $3\frac{1}{2}$ – $4\frac{1}{2}$ lines; of the wings 6–8 lines.

183. *DACUS TERMINIFER*, n. s. *Fœm.* Niger, nitens, breviusculus, capite rufescente, antennis fulvis, arista nuda, scutello pectorisque maculis duabus flavis, pedibus breviusculis, tibiis anterioribus femoribus posticis basi tarsisque albidis, alis vitreis, striga costali puncto apicali vittaque postica nigricantibus, halteribus testaceis.

Female. Black, shining, rather short; head reddish above; antennæ tawny, reaching the epistoma; 3rd joint linear, piceous towards the tip, which is rounded, about six times the length of the 2nd; arista slender, bare; scutellum dull yellow; pectus with an oblique yellow spot on each side; abdomen hardly broader than long, a little broader and shorter than the thorax; legs rather short; tarsi and anterior tibiæ whitish; hind femora whitish towards the base; wings vitreous, with a short black stripe extending from the base to near the hind border; costa with a blackish streak in the middle and with a blackish apical point; discal transverse vein straight, upright, parted by about one-third of its length from the border, and by more than its length from the præbrachial transverse, which is oblique and unusually long; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

184. *DACUS EMITTENS*, n. s. *Mas et Fœm.* Fulvus, facie brevi nigro biguttata, antennis pallide luteis, arista nuda, thorace lineis quinque rufescentibus, disco nonnunquam nigricante-cinereo, scutello callisque humeralibus flavis, abdomine nigro-fasciato, alis vitreis fusco plus minusve strigatis, halteribus albido-testaceis.

Male and Female. Tawny, convex, minutely pubescent; face short, with a black dot on each side; antennæ pale luteous, reaching the epistoma; 3rd joint linear, conical at the tip, full four times the length of the 2nd; arista slender, bare, much longer than the 3rd joint; thorax with five reddish lines; scutellum and humeral calli yellow; metathorax with a blackish mark on each side; abdomen short, oval, broader than the thorax, concave beneath, from whence in the female the lanceolate apical part proceeds; a protuberance on each side at the base, and a black middle band, behind which there is a slight longitudinal black line; wings vitreous, lurid and partly brown along the costa, brown along the subanal vein, and brown about the tips, excepting most of the space between the discal transverse vein and the border; veins tawny, partly black, slightly deviating; discal transverse vein nearly straight, parted by about one-third of its length from the border, and by more than its length from the oblique and rather long præbrachial transverse; halteres whitish testaceous. *Var. β.* Abdomen with two black bands. *Var. γ, Male.* Discal transverse vein not clouded with brown. *Var. δ, Male.* Præbrachial transverse vein clouded with brown. *Var. ε, Male.* Disk of the thorax blackish grey; wings vitreous, excepting a slight brown line along the costa,

and another along the subanal vein. *Var. ζ, Male.* Abdomen with a black interrupted subapical band. Length of the body 3-6 lines; of the wings 5-10 lines.

This species is closely allied to *D. ferrugineus* and to *D. trivittatus*, but may be distinguished by the luteous hue along the costa.

185. *DACUS DIFFUSUS*, n. s. *Fœm.* Testaceus, facie nigro fasciata, palpis nigro notatis, thoracis vittis duabus angustis abbreviatis et metathoracis fasciis duabus angustis nigris, abdomine fusiformi, alis subcinereis apud venas fuscescente subnebulosis.

Female. Testaceous, not shining; head paler about the eyes, with a black band on the face near the epistoma; palpi with a black mark on each outer side; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, more than four times the length of the 2nd; arista bare; thorax with two narrow abbreviated black stripes; metathorax with two slender black bands; abdomen fusiform, narrower and a little longer than the thorax; legs moderately long; wings slightly greyish, irregularly clouded with very pale brown about the veins; the latter black, testaceous towards the base; discal transverse vein straight, upright, parted by about one-fourth of its length from the border, and by much less than its length from the præbrachial transverse, which is undulating and very oblique. Length of the body 4 lines; of the wings 7 lines.

186. *DACUS FULVITARSIS*, n. s. *Fœm.* Niger, longiusculus, capite apud oculos albo, antennis piceis, abdomine lanceolato, femoribus basi fulvis, metatarsis subdilatis, tarsis posterioribus fulvis, alis cinereis nigricante nebulosis, halteribus testaceis.

Female. Black, rather long and narrow; head white about the eyes; face small; antennæ piceous, short; 3rd joint nearly round, a little longer than broad; arista long, bare; thorax elongate; abdomen lanceolate, longer than the thorax; femora tawny at the base; metatarsi slightly dilated; posterior tarsi tawny, with black tips; wings grey, partly clouded with blackish; veins black; discal transverse vein straight, upright, parted by about twice its length from the border, and by about thrice its length from the præbrachial transverse; halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. *CALLANTRA*, n. g.

Fœm. *Corpus* convexum. *Caput* thorace vix angustius. *Palpi* distincti, porrecti. *Antennæ* longæ, petiolo aut articulo 1° communi, arista nuda. *Thorax* brevis. *Abdomen* petiolatum, postice ovatum et valde convexum, subtus concavum. *Pedes* mediocres. *Alæ* sat angustæ.

Female. Body convex. Head almost as broad as the thorax; face vertical; palpi distinct, porrect; antennæ long, seated on a common petiole or first joint, with which the succeeding part forms a right angle; 3rd joint very slightly increasing in breadth from the base to

the tip, full thrice the length of the 2nd joint, which is rather long; arista bare, slender, a little longer than the 3rd joint. Thorax short. Abdomen petiolated, oval and very convex hindward, concave beneath, very much longer than the thorax. Legs moderately long. Wings rather narrow.

187. *CALLANTRA SMIEROIDES*, n. s. *Fæm.* Fulva, facie nigro-biguttata, antennis testaceis, thoracis fascia, scutello, callis duobus humeralibus, pectoris lituris duabus, abdominis fasciis duabus lituraque subapicali flavis, alis subcinereis apud costam fuscescentibus, halteribus testaceis.

Female. Tawny; head testaceous about the eyes; face with a black dot on each side; antennæ testaceous, extending beyond the epistoma; thorax with two yellow humeral calli, and with a yellow band which is continued on each side of the pectus, the latter having a yellow mark on each side hindward; scutellum yellow; abdomen with the hind borders of the 1st and 2nd segments yellow; a yellow capitate subapical mark, which is dilated on each side; wings slightly grey, brownish along the costa; veins black, tawny towards the base; a lurid tinge along the subanal vein; discal transverse vein oblique, nearly straight, parted by less than half its length from the border, and by more than its length from the præbrachial transverse; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings $7\frac{1}{2}$ lines.

Gen. *ARAGARA*, n. g.

- Fæm.* *Corpus* angustum. *Caput* supra planum, thorace latius; facies valde retracta. *Antennæ* brevissimæ; articulus 3^{us} subrotundus; arista nuda. *Thorax* longus, subcompressus. *Abdomen* ovatum, thorace brevius. *Pedes* antichi raptorii, coxis longissimis, femoribus incrassatis. *Alæ* sat angustæ.

Allied to *Dacus*.

Female. Body narrow. Head flat above, broader than the thorax; face much retracted. Antennæ very short; 3rd joint nearly round, a little longer than the 2nd; arista bare, slender. Thorax long, slightly compressed. Abdomen oval, shorter but hardly broader than the thorax. Fore legs raptorious; coxæ very long; femora incrassated; tibiæ shorter than the femora to which they are applied. Posterior legs moderately long and stout. Wings rather narrow.

188. *ARAGARA CRASSIPES*, n. s. *Fæm.* Cinereo-nigra, capite cyaneo, tarsis testaceis, alis cinereis, halteribus albis.

Female. Black, slightly covered with cinereous tomentum; head blue, shining, luteous on each side in front; antennæ black; thorax cinereous on each side; tarsi testaceous, with black tips; wings grey; veins black; præbrachial vein and subanal vein very near each other from the base to the discal transverse vein, which is straight and parted

by four times its length from the border, and by more than four times its length from the præbrachial transverse; halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. ENICOPTERA, *Macq.*

189. ENICOPTERA PICTIPENNIS, n. s. *Mas.* Fulva, longa, nitens, pubescens, capite luteo vitta lata, litura antica arcuata maculisque duabus lateralibus nigris, palpis nigro notatis, antennis basi nigro guttatis apice nigricantibus, abdomine longi-fusiformi nigricante basi fulvo, alis longis luteis apud costam nigris postice cinereis, vittis quatuor deviis fuscis.

Male. Tawny, long, shining, pubescent, testaceous beneath; head pale luteous, with a broad black stripe, which is dilated on each side; a black U-shaped mark about the face, which is black; a large black spot on each side of the peristoma; palpi partly black; antennæ blackish at the tips, and with a black dot on each at the base; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose; pectus with a minute blackish mark on each side in front; abdomen blackish, except towards the base, elongate-fusiform, much longer and narrower than the thorax; legs long, testaceous, minutely pubescent; wings long, luteous, cinereous along the inner part of the hind border; black along the exterior part of the costa, and with four irregular brown stripes which are abbreviated towards the base, the first also interrupted; veins luteous, black in the dark parts; radial vein undulating; cubital vein hardly undulating; præbrachial vein curved and inclined forward towards its tip; discal transverse vein very oblique, slightly curved outwards, parted by less than half its length from the border, and by more than its length from the præbrachial transverse. Length of the body 7 lines; of the wings 16 lines.

190. ENICOPTERA TORTUOSA, n. s. *Mas.* Fulva, longa, nitens, pubescens, facie argenteo bistrigata, thoracis vittis duabus fasciæque metathoracæ pectorisque disco nigris, abdomine lineari vittis duabus ventralibus nigris, alis longis vitreis subdilatatis, vitta costali fulva nigricante nebulosa, apice furcata, vittis duabus obliquis flavo-fuscis.

Male. Tawny, long, shining, minutely pubescent; head depressed above, with a silvery streak on each side of the face; antennæ reaching the epistoma; 3rd joint linear, slightly and obliquely truncated at the tip, full four times the length of the 2nd; arista plumose; thorax with an irregular black stripe along each side, and with a black band adjoining the scutellum; metathorax and disc of the pectus black; abdomen linear, much longer and narrower than the thorax, with a black stripe beneath; legs long, minutely pubescent; wings long, vitreous, somewhat dilated, tawny and partly shaded with blackish along the costa; this costal stripe dilated towards the base, and emitting a fork towards the tip; two oblique brown and yellow stripes,

which part from the hind border, are united on the præbrachial transverse vein, and there join the costal stripe, the exterior one very short; veins black; radial vein excessively contorted towards its tip; cubital vein straight till near its tip, where it is inclined hindward, and is slightly undulating; præbrachial vein very undulating exteriorly; subanal vein straight; discal transverse vein very oblique, nearly straight, parted by full one-fourth of its length from the border, and by full half its length from the præbrachial transverse, which is straight, upright, and unusually long. Length of the body 7 lines; of the wings 16 lines,

Enicoptera flava, Macq. (Dipt. Exot. Suppl. 3, 63), the type of this genus, inhabits Java, and is closely allied to *E. tortuosa*, and may be a local variety of the latter species, but differs from the character and figure. Macquart states that his description was taken from an apparently immature specimen.

191. *ENICOPTERA ARCUOSA*, n. s. *Mas.* Fulva, longa, nitens, pubescens, capite pallide luteo vitta lata biramosa fasciæque antica nigris, thoracis lineolis duabus maculisque duabus anterioribus pectorisque lituris duabus nigris, abdomine fusiformi, alis longis lutescentibus sat angustis apices versus fuscis postice cinereis, vitta discali albida, fascia exteriore alba antice furcata et arcuata.

Male. Tawny, long, shining, minutely pubescent; head pale luteous, with a broad black stripe which emits an oblique branch on each side to the eye, and with a black band by the epistoma; antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, thrice the length of the 2nd; arista plumose; thorax with two short black lines, each with a black spot in front; pectus with a black mark on each side; abdomen fusiform, longer but hardly narrower than the thorax; legs long, hardly pubescent; wings long, rather narrow, somewhat luteous, brown towards the tips, grey along the hind border, with a short whitish discal stripe which terminates in a white band, the latter abbreviated hindward and forked in front, the exterior fork much curved and terminating behind the tip of the wing; veins tawny, black towards the tips; radial vein slightly undulating opposite the præbrachial transverse vein; the other veins straight; discal transverse vein slightly oblique, slightly curved outward, parted by full one-third of its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 6 lines; of the wings 14 lines.

192. *ENICOPTERA ? PLAGIFERA*, n. s. *Fæm.* Testacea, longiuscula, frontis puncto nigro, facie nigricante-cinerea, palpis nigro guttatis, antennis luteis, thoracis lineis tribus strigisque duabus exterioribus, metathorace pectorisque lituris nigris, abdomine fusiformi fasciis duabus basalibus nigris; alis vitreis longiusculis, strigis duabus basalibus fasciis duabus plagaque subapicali fuscis.

Female. Testaceous, rather long, not shining, with a few black bristles;

head a little narrower than the thorax, with a black point on the front; face blackish grey; palpi with a black dot on each outer side; antennæ pale luteous, not reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista bare; thorax with three black lines and with two short and more exterior black streaks; metathorax black, shining; pectus with some black marks on each side; abdomen fusiform, hardly longer than the thorax, with two black bands near the base; legs moderately long; wings vitreous, rather long, with two narrow brown bands, the interior band emitting two brown streaks to the base of the wing, the exterior band curved, continued along the costa to the tip of the radial vein, the space beyond it mostly occupied by an elliptical brown patch; veins black, straight; discal transverse vein straight, upright, parted by more than half its length from the border, and by nearly twice its length from the oblique præbrachial transverse. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Gen. ORTALIS, *Fallen.*

The two following species belong to a new group of *Ortalis*, and will probably form a distinct genus.

193. ORTALIS DECATOMOIDES, n. s. *Mas.* Obscure rufa, thorace brevi, abdomine nigro, fusiformi, basi rufo, pedibus fulvis, femoribus posterioribus basi albidis, tibiis posticis nigris, alis subcinereis, macula apicali fasciisque duabus nigricantibus.

Male. Dull red; head rather large, a little broader than the thorax, blackish on each side of the face; antennæ wanting; thorax short; abdomen black, shining, fusiform, red at the base, a little narrower but hardly longer than the thorax; legs tawny; posterior femora whitish at the base; hind tibiæ black; wings slightly greyish, rather convex along the hind border, blackish at the tips, and with two blackish bands; first band rather oblique; veins black; præbrachial vein and cubital vein slightly curved and approximating towards the tip of the wing; discal transverse vein straight, upright, short, parted by much more than its length from the border, and by full twice its length from the præbrachial transverse, which is extremely short; Length of the body $1\frac{1}{4}$ line; of the wings $2\frac{1}{2}$ lines.

194. ORTALIS VACILLANS, n. s. *Fæm.* Fulva, arista pubescente, abdomine nigro postice lanceolato, alis limpidis, costa striga basali fascisque tribus nigricantibus.

Closely allied to *D. decatomoides*. *Female.* Tawny, shining; head full as broad as the thorax; epistoma slightly prominent; antennæ nearly reaching the epistoma; 3rd joint linear, conical towards the tip, about four times the length of the 2nd; arista pubescent; abdomen black, a little longer than the thorax, lanceolate hindward; wings limpid, blackish along the costa, with a blackish streak, and with three slen-

der blackish bands; 1st band short, oblique, abbreviated hindward by the end of the basal streak; 2nd curved, slightly abbreviated hindward; 3rd nearly straight, entire; discal transverse vein upright, nearly straight, parted by less than half its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

Gen. TRYPETA, *Meigen*.

195. TRYPETA BASIFASCIA. *Fæm.* Ferruginea, longiuscula, capite antennisque luteis, arista plumosa, metathorace nigro, pectoris disco nigricante, abdomine nigro basi fulvo, pedibus halteribusque fulvis, femoribus posterioribus nigricantibus, alis nigris albo notatis basi vitreis.

Female. Ferruginous, shining, rather long; head luteous, white about the eyes, narrower than the thorax; face rather long; sides of the peristoma slightly dilated; antennæ luteous, very short, not extending to half the length of the face; 3rd joint conical, much longer than the 2nd; arista plumose; metathorax black; disk of the pectus blackish; abdomen black, fusiform, tawny towards the base, a little longer than the thorax; legs and halteres tawny; posterior femora blackish; wings black, mostly vitreous towards the base, with two white spots on the costa, with two on the hind border, and with four or five transverse white dots on the disk; veins black, tawny at the base; discal transverse vein straight, upright, parted by much less than its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 7 lines.

196. TRYPETA NIGRIFASCIA, n. s. *Mas.* Fulva, capite antennisque pallide luteis, arista plumosa, thoracis lineis duabus et fascia metathoraceque nigris, abdomine elliptico, alis vitreis latiusculis, vitta costali fulva vittaque postica fusca.

Male. Tawny, shining; head pale luteous, whitish on the face and about the eyes; antennæ pale luteous, not near reaching the epistoma; 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose; thorax with an irregular black line on each side, and with a black band in front of the scutellum; metathorax black; abdomen elliptical, much shorter and a little narrower than the thorax; wings vitreous, rather broad, with a broad tawny stripe, which occupies the whole base and extends beyond the tip along the costa, where it contains some grey marks; a brown stripe near the hind border, abruptly angular exteriorly; veins tawny; discal transverse nearly straight and upright, parted by less than half its length from the border, and by more than its length from the præbrachial transverse. Length of the body 3 lines; of the wings 6 lines.

197. TRYPETA LATIVENTRIS, n. s. *Mas.* Fusca, lata, depressa, capite, antennis, scutello abdomineque rufescentibus, arista subpubes-

cente, abdomine vitta interrupta nigra, pedibus testaceis, femoribus nigricantibus postice cinereis, lituris costalibus et marginalibus vitreis.

Male. Brown, rather broad and flat; head reddish, a little narrower than the thorax, testaceous on the face and about the eyes; face quite flat; antennæ reddish, not near reaching the epistoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista minutely pubescent; thorax with black bristles on each side; scutellum and abdomen dark reddish, the latter broader and not longer than the thorax, with a black stripe which is interrupted on the hind border of each segment; legs testaceous; femora blackish, testaceous towards the tips; wings blackish, rather broad, cinereous along the basal part of the hind border, with two small vitreous marks towards the tip of the costa, and with three vitreous marks hindward, the middle one much larger than the other two; veins black; discal transverse vein nearly straight and upright, parted by a little less than half its length from the border, and by a little less than its length from the præbrachial transverse; alulæ and halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

198. *TRYPETA STELLIPENNIS*, n. s. *Mas et Fæm.* Ferruginea, capite antennisque pallide luteis, arista plumosa, metathorace nigricante, abdomine fusiformi, pedibus halteribusque testaceis, alis nigricantibus latiusculis, guttis marginalibus punctisque discalibus albis.

Male and Female. Ferruginous, paler beneath; head pale luteous, not so broad as the thorax; epistoma not prominent; antennæ pale luteous, not near reaching the epistoma; 3rd joint linear, rounded at the tip, full twice the length of the 2nd; arista plumose; metathorax blackish; abdomen fusiform, narrower and a little longer than the thorax; oviduct of the female cylindric-lanceolate; legs and halteres testaceous; wings blackish, rather broad, white at the tips, with white marginal dots and with white discal points; veins black; discal transverse vein upright, nearly straight, parted by a little more than one-fourth of its length from the border, and by about its length from the præbrachial transverse, which is rather long. Length of the body $2\frac{1}{2}$ – $3\frac{1}{2}$ lines; of the wings 5–6 lines.

199. *TRYPETA AMPLIFENNIS*, n. s. *Fæm.* Cinerea, capite antennis pedibus halteribusque fulvis, arista nuda, abdomine nigro fusiformi basi fulvo apicem versus lanceolato, alis nigris latissimis albo guttatis.

Female. Cinereous, dull; head tawny, whitish about the eyes; face flat; antennæ tawny, very short, not extending beyond half the length of the face; 3rd joint conical, a little longer than the 2nd; arista bare; abdomen fusiform, black, shining, tawny towards the base, lanceolate towards the tip, a little narrower and much longer than the thorax; legs and halteres tawny; wings black, very broad, with a white apical spot, with some white marginal and discal dots, and with two larger white transverse costal marks; veins black, tawny at the

base; discal transverse vein straight, upright, parted by about half its length from the border, and by a little less than its length from the præbrachial transverse. Length of the body 3 lines; of the wings 6 lines.

200. *TRYPETA APPROXIMANS*, n. s. *Fæm.* Nigra, nitens, capite rufescente, facie cinerea, abdomine elliptico apicem versus lanceolato, pedibus fulvis, femoribus nigris, alis nigricantibus albo maculatis.

Female. Black, shining; head reddish; face cinereous; abdomen elliptical, lanceolate towards the tip, much longer than the thorax; legs tawny; femora black; wings blackish, with two white triangular spots on the costa, with three white dots on the disk, with three white streaks on the hind border, and with two white subapical streaks; veins black; discal transverse vein nearly straight and upright, parted by much less than its length from the border, and by a little less than its length from the præbrachial transverse. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

Gen. SOPHIRA, *Walk.*

201. *SOPHIRA BISTRIGA*, n. s. *Fæm.* Fulva, capite luteo, arista plumosa, thorace pectoreque nigro maculatis, metathorace vittis duabus nigris, abdomine fusiformi maculis lateralibus nigris, oviductu lanceolato, alis nigricantibus albo bifasciatis basi fulvis.

Female. Tawny, shining; head luteous, hardly as broad as the thorax, white about the eyes; antennæ tawny, not near reaching the epistoma; 3rd joint elongate-conical, more than twice the length of the 2nd; arista plumose; thorax with four large black spots; metathorax with two black stripes; pectus with two elongated black spots on each side; abdomen fusiform, with a long lanceolate flat oviduct, much longer than the thorax; each segment with two large lateral black spots; wings blackish, tawny towards the base, with two white bands, the exterior band curved outward in front, and not extending to the costa; veins black, tawny towards the base; discal transverse vein curved outward, parted by full one-fourth of its length from the border, and by very much more than its length from the præbrachial transverse. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Gen. PALLOPTERA, *Fallen.*

202. *PALLOPTERA DETRACTA*, n. s. *Mas.* Testacea, capite apud oculos cinereo, arista subpubescente, abdomine guttis duabus lateralibus subapicalibus nigris, alis cinereis.

Male. Testaceous; head pale cinereous behind and about the eyes; antennæ short, tawny; arista very minutely pubescent; abdomen oval, not longer than the thorax, with a black dot on each side of the subapical segment; wings grey; veins black, testaceous at the base;

discal transverse vein straight, upright, parted by hardly half its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. DIOPSIDES, *Walk.*

Gen. DIOPSIS, *Linn.*

203. *Diopsis subnotata*, *Westw. Orient. Ent.* pl. 18. f. 2.

Inhabits also the Philippine Islands.

204. *DIOPSIS DETRAHENS*, n. s. *Fæm.* Nigra, capite ex parte ferrugineo, oculorum petiolis breviusculis, abdomine subtus lurido, coxis femoribusque fulvis, his apice nigris, alis nigricantibus macula subcostali alba.

Female. Black; head partly ferruginous; petioles of the eyes each equal in length to the space between them; abdomen lurid beneath; coxæ and femora tawny, the latter with black tips; wings blackish, with a white subcostal spot towards the tip; veins black; halteres piceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Subfam. SEPSIDES, *Walk.*

Gen. CALOBATA, *Fabr.*

205. *CALOBATA RESOLUTA*, n. s. *Mas.* Nigra, abdomine lineari longo, segmentis albedo marginatis, pedibus longissimis, femoribus posterioribus testaceo trifasciatis, femoribus anticis basi coxisque anticis testaceis, tarsis anticis albis, alis cinereis apices versus obscurioribus fascia subapicali albida.

Male. Black, slightly shining; pectus with an oblique cinereous band on each side; abdomen linear, pale beneath, much narrower than the thorax, and nearly twice its length, hind borders of the segments whitish; legs black, very long; posterior femora with three testaceous bands; fore femora at the base, and fore coxæ, testaceous; fore tarsi white; wings dark grey, blackish grey on each side of a whitish subapical band; veins black: discal transverse vein straight, upright, parted by about half its length from the border, and by more than four times its length from the præbrachial transverse; halteres piceous. Length of the body 6 lines; of the wings 10 lines.

206. *CALOBATA IMPINGENS*, n. s. *Mas et Fæm.* Obscure cyanea, antennis rufis, abdomine subtus ferrugineo segmentis albo marginatis, pedibus fulvis, femoribus tibiisque anticis nigris, illis basi fulvis, femoribus posterioribus nigro trifasciatis, tibiisque posterioribus obscure fulvis, tarsis anticis albis basi nigris, alis cinereis fusco bifasciatis.

Male and Female. Dark blue; head white about the eyes; antennæ red; abdomen lanceolate, ferruginous beneath, narrower and very

much longer than the thorax, hind borders of the segments white ; legs tawny, very long ; posterior coxæ and fore tibiæ black ; posterior femora with three black bands ; fore femora black, tawny towards the base ; posterior tibiæ and posterior tarsi dark tawny ; fore tarsi white, black at the base ; wings grey, with two brown bands, the second apical ; veins black ; cubital vein and præbrachial vein converging to the tip of the wing ; discal transverse vein straight, upright, parted by much less than its length from the border, and by more than thrice its length from the præbrachial transverse. *Var. β* : Bands of the wings broader and more complete. Length of the body 4-5 lines ; of the wings 7-8 lines.

This species is erroneously recorded as *C. indica* in Vol. III. p. 124.

207. *CALOBATA BIFASCIATA*, n. s. *Fæm.* *Nigra*, longissima, gracillima, capite litura transversa albida, arista breviscula basi robusta, abdominis dimidio antico subclavato fasciis duabus cinereis, dimidio postico lanceolato, femoribus posticis basi albidis apice rufescentibus, tarsis anticis albis apice nigris, alis cinereis nigricante bifasciatis.

Female. Black, very long and slender ; head with a whitish transverse mark in front of the face, which is very short ; 3rd joint of the antennæ elongate-conical, more than twice the length of the 2nd ; arista rather short, stout towards the base ; thorax attenuated in front ; abdomen more than twice the length of the thorax, broadest in the middle, subclavate to half its length, lanceolate from thence to the tip, two cinereous bands on the basal half ; legs long ; hind femora whitish at the base, reddish at the tips ; fore tarsi white, with black tips ; wings grey, slightly blackish at the tips, and with two blackish bands, the second broader and more complete than the first ; veins black ; cubital vein and præbrachial vein slightly converging towards the tip of the wing ; discal transverse vein straight, oblique, parted by less than its length from the border, and by more than thrice its length from the præbrachial transverse. Length of the body 5 lines ; of the wings 8 lines.

Gen. *CARDIACEPHALA*, *Macq.*

208. *CARDIACEPHALA VARIPES*, n. s. *Mas.* *Testacea*, gracillima, capite subelongato, antennis pallide rufis basi nigris, thorace antico attenuato, abdomine lineari apicem versus tumido, femoribus intermediis subincrassatis, tibiis intermediis nigris, tarsis intermediis albis apice nigris, alis pallide fusciscentibus, basi fasciæ cinerascens.

Male. Testaceous, very slender ; head somewhat elongated ; antennæ pale red, black at the base ; thorax long, attenuated in front ; abdomen linear, tumid towards the tip, narrower and much longer than the thorax ; legs very long ; fore legs much shorter and more slender than the others ; middle femora slightly incrassated, except towards the tips ; middle tibiæ black ; middle tarsi white, with black tips ; wings

pale brownish, greyish towards the base and with a greyish band beyond the discal transverse vein; veins black, testaceous towards the base; cubital vein and præbrachial vein slightly converging towards the tip of the wing; discal transverse vein straight, upright, parted by less than its length from the border, and by about thrice its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. SEPSIS, *Fallen.*

209. SEPSIS TESTACEA, n. s. *Mas et Fæm.* Testacea aut fulva, antennis pallide rufis, abdomine subpubescente, alis cinerascentibus, costa basali nigra. *Var. β.* Abdomine piceo basi fulvo.

Male and Female. Testaceous or tawny, slightly setose; antennæ pale red, 3rd joint conical, about twice the length of the 2nd; abdomen slightly pubescent; wings greyish, black along the costa towards the base; veins black; discal transverse vein straight, upright, parted by a little more than its length from the border, and by more than its length from the præbrachial transverse. *Var. β:* Abdomen piceous, tawny towards the base. Length of the body 2-3 lines; of the wings 3-4 lines.

210. SEPSIS FRONTALIS, n. s. *Mas.* Nigra, capite antico, antennis, pedibus anticis femoribusque posterioribus basi testaceis, alis vitreis. *Fæm.* Fulva, abdomine nigro.

Male. Black, shining; head in front and antennæ testaceous; fore legs testaceous; posterior femora testaceous towards the base; wings vitreous; veins black; discal transverse vein straight, oblique, parted by twice its length from the border, and from the præbrachial transverse. *Female.* Tawny; abdomen black. Length of the body 1 line; of the wings 2 lines.

211. SEPSIS FASCIPE, n. s. *Fæm.* Nigra, subnitens, antennis pallide rufis, abdomine fusiformi postice attenuato, pedibus albis, tibiis intermediis femoribusque nigris, tibiis posticis basi apiceque nigris, alis cinereis macula apicali nigra.

Female. Black, slightly shining; antennæ pale red, very short, 3rd joint conical; abdomen fusiform, lanceolate and much attenuated towards the tip, much longer than the thorax; legs white; femora and middle tibiæ black; hind tibiæ black at the base and at the tips; wings grey, with a black spot at the tip of the costa; veins black; discal transverse vein straight, upright, parted by its length from the border, and by full twice its length from the præbrachial transverse. Length of the body $\frac{3}{4}$ line; of the wings 3 lines.

212. SEPSIS REVOCANS, n. s. *Fæm.* Cupreo-nigra, antennis nigris, pedibus halteribusque testaceis, alis subcinerascentibus basi nigricantibus.

Female. Cupreous-black, shining; antennæ black, very short; legs

testaceous; wings slightly greyish, blackish at the base of the costa; veins black; discal transverse vein straight, upright, parted by more than twice its length from the border, and by less than twice its length from the præbrachial transverse; halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 2 lines.

Subfam. PSILIDES, *Walk.*

Gen. MICROPEZA, *Macq.*

213. *Micropeza fragilis*, *Walk.* See Vol. I. p. 37.

Gen. CÆNURGIA, n. g.

Mas. *Corpus* gracile. *Caput* elongatum, antice conicum. *Antennæ* porrectæ; articulus 3^{us} lanceolatus; arista apicalis, sat robusta. *Thorax* linearis. *Abdomen* fusiforme, thorace vix angustius, non longius. *Pedes* longi; femora lata, compressa; tarsi antici articulo 1^o dilatato fusiformi. *Alæ* breviusculæ, sat angustæ.

Allied to *Nerius*. *Male*. Body slender. Head elongate, conical in front, as broad as the thorax. *Antennæ* porrect; 1st and 2nd joints short; 3rd lanceolate; arista rather stout, apical, larger than all the preceding joints. *Thorax* linear. *Abdomen* fusiform, hardly narrower and not longer than the thorax. Legs long, femora broad, compressed; fore tarsi with the first joint dilated, fusiform. Wings rather short and narrow.

214. CÆNURGIA REMIPES, n. s. *Mas.* Fulva, capite guttis tribus nigris, antennis basi nigris, arista alba, thorace maculis duabus nigris, pedibus nigris, coxis femoribusque luteis apice nigris, alis flavo-cinereis, halteribus apice nigris.

Male. Tawny; head with a black spot on the vertex, and with two black dots on each side, one in front, the other behind; antennæ black towards the base; arista white; thorax with a black spot on each side in front; legs black; coxæ and femora luteous, with black tips; wings grey, tinged with yellow; veins black; cubital vein and præbrachial vein converging towards the tip of the wing; discal transverse vein straight, oblique, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse; halteres with black knobs. Length of the body $3\frac{1}{2}$ lines; of the wings $5\frac{1}{2}$ lines.

Gen. NERIUS, *Wied.*

215. *Nerius fuscipennis*, *Macq.* See Vol. I. p. 38.

Gen. SERACA, n. g.

Fem. *Corpus* longiusculum. *Caput* transversum, thorace vix angustius. *Antennæ* breves, articulo 3^o conico, arista plumosa. *Thorax* ellip-

ticus. *Abdomen* ellipticum. *Pedes* mediocres. *Alæ* longiusculæ, latiusculæ.

Female. Body rather long. Head transverse, nearly as broad as the thorax; epistoma not prominent. Antennæ short, not near reaching the epistoma; 3rd joint conical, much longer than the 2nd; arista plumose. Thorax and abdomen elliptical, about equal in length. Legs moderately long and slender. Wings rather long and broad.

216. *SERACA SIGNIFERA*, n. s. *Fæm.* Fulva, thorace vittis quatuor metathorace vittis duabus abdomine maculis lateralibus nigris, alis obscure fuscis albo quinquesignatis apud costam nigricantibus basi flavis.

Female. Tawny, shining; head testaceous about the eyes; thorax with four black stripes, the outer pair incomplete; metathorax with two black stripes; abdomen with a row of black spots along each side; wings dark brown, blackish along the costa, yellow at the base, with five lanceolate white marks, two of these resting on the costa, the third between them near the hind border, the fourth exterior, discal, slender, oblique, the fifth on the hind border near the tip; veins black, tawny at the base; discal transverse vein curved outward, parted by about one-fourth of its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 8 lines.

217. *SERACA SIGNATA*, n. s. *Fæm.* Testacea, longiuscula, epistomate guttis duabus nigris, arista plumosa, abdomine postice attenuato maculis duabus lateralibus subapicalibus, alis cinerascentibus, costa exterioriore nigricante.

Female. Testaceous, shining, rather long; head nearly as broad as the thorax, with a black dot on each side of the epistoma; antennæ short, 3rd joint elongate-conical, arista plumose; thorax elliptical; abdomen attenuated hindward, longer than the thorax, with a black spot on each side of the 5th segment; wings greyish, blackish along the apical half of the costa; veins testaceous, black towards the tips; discal transverse vein nearly straight and upright, parted by about one-fourth of its length from the border, and by hardly more than its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Gen. *PSILA*, Meigen.

218. *PSILA BIPUNCTIFERA*, n. s. *Fæm.* Testacea, facie nigro bipunctata, antennarum articulo 3^o longiconico, arista pubescente, abdomine guttis duabus apicalibus nigris, alis pallide cinereis flavo suffusis.

Female. Testaceous; head somewhat pilose beneath, with a black point on each side of the face; 3rd joint of the antennæ elongate-conical, about twice the length of the 2nd; arista pubescent; thorax elongate, somewhat flat above; abdomen fusiform, a little longer than the thorax;

5th segment with a black dot on each side; wings pale cinereous, tinged with yellow; veins yellow; discal transverse vein straight, oblique, parted by hardly more than one-fourth of its length from the border, and by more than its length from the præbrachial transverse. Length of the body 5 lines; of the wings 10 lines.

219. *PSILA MUNDA*, n. s. *Mas et Fæm.* Nigra, nitens, facie testacea nigro notata, antennis testaceis basi nigris, arista plumosa, thorace subcinerascens, scutello obscure testaceo, pedibus testaceis, alis cinereis apud costam nigricantibus, halteribus albidis.

Male and Female. Black, shining; head testaceous, blackish above; disk of the face black, shining: antennæ short, testaceous, black at the base; 3rd joint linear, rounded at the tip, about twice the length of the 2nd; arista plumose: thorax linear, with slight cinereous tomentum; scutellum dull testaceous; abdomen fusiform, a little longer than the thorax; legs testaceous; wings grey, blackish along the costa towards the tips; veins black; discal transverse vein straight, upright, parted by about half its length from the border, and by nearly thrice its length from the præbrachial transverse; halteres whitish. Length of the body $2\frac{1}{2}$ –3 lines; of the wings 4–5 lines.

Gen. *TEXARA*, *Walk.*

220. *TEXARA* *DIOTRIOIDES*, n. s. *Mas et Fæm.* Nigra, longa, gracilis, capite nigro-cyaneo, thorace vittis quatuor cinereis, segmentorum abdominalium lateribus albo marginatis, pedibus fulvo fasciatis, alis cinereis, halteribus testaceis.

Male and Female. Black, long, slender; head bluish-black, white about the eyes in front; antennæ of the male piceous, of the female tawny, 3rd joint round, arista minutely pubescent; thorax with four cinereous stripes; abdomen about twice the length of the thorax, cylindrical towards the base, subclavate in the male and elongate-fusiform in the female hindward: hind borders of the segments white on each side; fore femora, hind tibiæ and hind tarsi tawny at the base; middle legs and hind femora tawny, the latter with a broad black band; fore tibiæ white, black at the base; wings grey; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by almost four times its length from the præbrachial transverse; halteres testaceous. Length of the body 4– $4\frac{1}{2}$ lines; of the wings 6–7 lines.

Gen. *GOBRYA*, n. g.

Mas. *Corpus* gracillimum. *Caput* thorace multo latius; frons sat angusta; facies plana. *Oculi* magni. *Antennæ* brevissimæ; articulus 3^{us} conicus; arista pubescens. *Thorax* sat parvus. *Abdomen* cylindricum, gracillimum, apice clavatum, thorace duplo longius. *Pedes* graciles; anteriores breves; postici longiusculi. *Alæ* perangustæ.

Male. Body very slender. Head much broader than the thorax; front rather narrow; face vertical, flat; eyes large, prominent. Antennæ very short; 3rd joint conical, longer than the 2nd; arista pubescent. Thorax rather small. Abdomen clavate, about twice the length of the thorax, cylindrical and very slender till near its tip. Legs slender; anterior legs short; hind legs rather long. Wings very narrow; discal transverse vein straight, upright, parted by more than its length from the border, and by more than four times its length from the præbrachial transverse.

221. *GOBRYA BACCHOIDES*, n. s. *Mas.* Cyanea, nitens, antennis pedibusque pallide flavis, abdomine nigro fasciis duabus flavis, femoribus posterioribus tibiisque posticis nigris, tarsis posticis basi nigris, alis vix cinerascentibus, halteribus flavis apice nigris.

Male. Blue, shining; proboscis, antennæ, and legs pale yellow; abdomen black, with two pale yellow bands, the hind one very slender; posterior femora and hind tibiæ black, the former pale yellow at both ends; middle tibiæ and tarsi wanting; hind tarsi black towards the base; wings hardly greyish, apical third part brown; veins black; halteres pale yellow, with black knobs. Length of the body $2\frac{3}{4}$ lines; of the wings 4 lines.

Subfam. OSCINIDES, *Haliday*.

Gen. OSCINIS, *Fabr.*

222. *OSCINIS FEMORATA*, n. s. *Mas.* Atra, nitens, capite nigro-cyaneo, femoribus anterioribus basi, tibiis anterioribus apice, tarsis halteribusque flavis, femoribus posticis incrassatis, alis cinerascentibus.

Male. Deep black, shining; head bluish-black; abdomen conical, shorter than the thorax; legs black; anterior femora at the base, anterior tibiæ at the tips, and tarsi yellow; hind femora incrassated; wings greyish; veins black; discal transverse vein straight, upright, parted by more than its length from the border, and by much more than its length from the præbrachial transverse; halteres yellow. Length of the body $1\frac{1}{4}$ line; of the wings 2 lines.

Gen. PIOPHILA, *Fallen.*

223. *PIOPHILA CONTECTA*, n. s. *Fæm.* Nigra, nitens, oviductu lanceolato, pedibus halteribusque fulvis, pedibus anticis nigris, femoribus basi fulvis, alis cinereis.

Female. Black, shining; oviduct prominent, lanceolate; legs and halteres tawny; fore legs black; coxæ, femora at the base and knees tawny; wings grey; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

Gen. *OPOMYZA*, *Fallen.*

224. *OPOMYZA NIGRIFINIS*, n. s. *Fem.* Cinerea, capite antennisque pallide rufis, arista plumosa, thorace bilineato, pectore halteribusque albis, abdomine fulvo lanceolato apicem versus nigro, pedibus fulvis, alis nigris albo guttatis.

Female. Cinereous; head pale red, white beneath; antennæ pale red, very short, 3rd joint nearly round, arista plumose; thorax with two indistinct darker lines; pectus and halteres white; abdomen lanceolate, tawny, shining, black towards the tip; legs tawny; wings black, rather narrow, with about ten white dots, of which two are larger than the others, and form a broken and almost interrupted band near the base; veins black; discal transverse vein straight, upright, parted by about half its length from the border; no præbrachial transverse vein. Length of the body $1\frac{1}{4}$ – $1\frac{1}{2}$ lines; of the wings $2\frac{1}{2}$ –3 lines.

Gen. *DROSOPHILA*, *Fallen.*

225. *DROSOPHILA SOLENNIS*, n. s. *Mas.* Testacea, facie carinata, thorace vittis quatuor fulvis, abdomine fasciis abbreviatis nigricantibus, alis cinereis.

Male. Testaceous; face keeled; antennæ wanting; thorax with four tawny stripes; abdomen elliptical, a little longer than the thorax, with blackish abbreviated bands; wings grey; veins black; discal transverse vein straight, upright, parted by hardly less than its length from the border, and by about thrice its length from the præbrachial transverse. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

226. *DROSOPHILA RUDIS*, n. s. *Mas.* Fulva, facie albida, abdomine nigro nitente basi fulvo, pedibus halteribusque testaceis, alis cinereis apud costam obscurioribus maculis quatuor nigricantibus.

Male. Tawny, testaceous beneath; face whitish; antennæ wanting; abdomen elongate-oval, black, shining, tawny at the base, not longer than the thorax; legs and halteres testaceous; wings grey, darker along the costa, with four blackish spots, first spot subcostal, larger than the second which is discal, third apical, band between the second and third spots irregular, attenuated hindward; veins black; discal transverse vein straight, upright, parted by nearly its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

227. *DROSOPHILA ILLATA*, n. s. *Fem.* Fulva, segmentorum abdominalium marginibus pedibusque testaceis, alis cinereis.

Female. Tawny; antennæ very short, 3rd joint conical, arista thinly plumose; abdomen oval, not longer than the thorax, hind borders of the segments and legs testaceous; wings grey; veins black, tawny at the base; discal transverse vein straight, upright, parted by about its length from the border, and by nearly four times its length from the præbrachial transverse. Length of the body $1\frac{1}{4}$ line; of the wings $2\frac{1}{2}$ lines.

228. *DROSOPHILA LURIDA*, n. s. *Mas.* Atræ, capite piceo, arista plumosa, abdomine lurido subpubescente, pedibus obscure fulvis, alis lurido-cinereis, punctis marginalibus nigris, vena transversa præbrachiali nigro nebuloza.

Male. Deep black; head piceous; antennæ short, 3rd joint elongate-conical, arista thinly plumose; pectus piceous; abdomen oval, lurid red, minutely pubescent, not longer than the thorax; legs dull tawny; wings lurid grey, blackish at the base, with black points at the tips of the longitudinal veins; veins yellowish; discal transverse vein straight, upright, with a black point at each end, parted by less than its length from the border, and by about twice its length from the præbrachial transverse, which is clouded with black. Length of the body 2 lines; of the wings 4 lines.

229. *DROSOPHILA LATERALIS*, n. s. *Mas.* Fulva, subtus testacea, abdomine maculis lateralibus nigris, pedibus halteribusque testaceis, alis cinereis.

Male. Tawny, testaceous beneath; antennæ short, 3rd joint conical, arista plumose; abdomen not longer than the thorax, with black spots along each side; legs and halteres testaceous; wings grey; veins black. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Gen. DISCOMYZA, *Meigen*.

230. *DISCOMYZA OBSCURATA*, n. s. *Fæm.* Cinereo-nigra, capite abdomineque nigris nitentibus, antennis obscure rufis, arista plumosa, pectoris lateribus albido conspersis, alis cinereis fascia informi maculaque apicali nigricantibus, halteribus albis.

Female. Cinereous black; head black, shining; antennæ short, dark red, 3rd joint conical, longer than the 2nd, arista thinly plumose; sides of the pectus with minute whitish speckles; abdomen elliptical, flat, black, shining, longer than the thorax; legs black; wings grey, with an irregular blackish band which does not extend to the hind border, and with a blackish apical spot; veins black; discal transverse vein straight, oblique, parted by much less than its length from the border, and by very much more than its length from the præbrachial transverse, which is clouded with black; halteres white. Length of the body 2 lines; of the wings 3 lines.

Gen. NOMBA, n. g.

Mas et Fæm. Corpus latum, crassum. *Frons* lata. *Antennæ* brevissimæ; articulus 3^{us} subrotundus; arista subpubescens. *Thorax* subpubescens, quasi coriaceus; scutellum parvum; metathorax maximus, abdomen alasque incumbentes obtegens. *Pedes* breves, robusti; femora subincrassata; tibiæ arcuatæ. *Alæ* parvæ.

Male and Female. Body broad, thick, compact. Head almost as broad as the thorax; front broad, narrower than the epistoma; face vertical.

Antennæ very short; third joint nearly round; arista very minutely pubescent. Thorax solid, apparently horny, very minutely pubescent; scutellum small; metathorax elliptical, enormously developed, covering the whole abdomen, sheltering the wings when in repose. Legs short, stout; femora slightly incrassated; tibiæ curved. Wings concealed beneath the metathorax.

231. *NOMBA TECTA*, n. s. *Mas et Fæm.* Nigra, obscura, antennis piceis, tarsis flavis apice nigris, alis cinereis.

Male and Female. Black, dull; antennæ piceous; tarsi yellow, with black tips; wings grey; veins black. Length of the body $1\frac{1}{2}$ – $1\frac{3}{4}$ line; of the wings $2\frac{1}{2}$ –3 lines.

Subfam. HYDROMYZIDES, *Haliday*.

Gen. NOTIPHILA, *Fallen*.

232. *NOTIPHILA LINEOSA*, n. s. *Mas et Fæm.* Fusca, obscura, capite apud oculos linea frontali et epistomate albidis, arista plumosa, thorace lineis sex albidis, abdomine nigro segmentorum marginibus fulvis, pedibus nigris, tibiis anticis genubus tarsis halteribusque fulvis, alis cinereis.

Male and Female. Brown, dull; head whitish about the eyes, and with a whitish line on the front; epistoma whitish; antennæ not near reaching the epistoma, 3rd joint elongate, arista thinly plumose; thorax with six whitish lines, the lateral pair incomplete; abdomen black, not longer than the thorax, hind borders of the segments tawny; legs black, tarsi, knees, posterior tibiæ at the tips, and fore tibiæ tawny; wings grey; veins black; discal transverse vein straight, upright, parted by more than its length from the border, and by full thrice its length from the præbrachial transverse; halteres tawny. Length of the body $1\frac{3}{4}$ –2 lines; of the wings $3\frac{1}{2}$ –4 lines.

The two following species belong to the group of which *N. Cinerea* is the type.

233. *NOTIPHILA QUADRIFASCIA*, n. s. *Fæm.* Fusca, subtus cinerea, capite antico amplo, facie convexa, antennis nigris, arista plumosa, metathorace abdominisque maculis duabus basalibus fasciisque quatuor albidis, genubus tarsisque rufescentibus, alis cinereis puncto costali nigro, halteribus testaceis.

Female. Brown, cinereous beneath; head large and somewhat tumid in front and beneath; face cinereous, convex; antennæ black, very small, 3rd joint conical, arista plumose; metathorax whitish; abdomen with a whitish spot on each side at the base, and with four whitish bands, of which the 3rd and 4th are interrupted; legs cinereous black, knees and tarsi reddish; wings grey, with a black costal point at the tip of the subcostal vein; veins black; discal transverse vein oblique, nearly straight, parted by less than half its length from the

border, and by nearly thrice its length from the præbrachial transverse ; halteres testaceous. Length of the body $2\frac{1}{2}$ lines ; of the wings 4 lines.

234. *NOTIPHILA FLAVILINEA*, n. s. *Mas et Fæm.* Piceo-nigra, capite apud oculos testaceo, antennis rufescentibus, arista plumosa, abdominis segmentis flavo marginatis, alis cinereis apud costam sub-luridis, halteribus testaceis.

Male and Female. Piceous brown ; head rather paler, testaceous about the eyes ; antennæ reddish, very short, 3rd joint conical, arista plumose ; abdomen oval, not longer than the thorax ; hind borders of the segments yellow ; wings grey, with a slight lurid tinge along the costa ; veins black ; discal transverse vein straight, upright, parted by less than its length from the border, and by a little more than twice its length from the præbrachial transverse ; halteres testaceous. Length of the body $2\frac{1}{2}$ lines ; of the wings 4 lines.

Gen. EPHYDRA. *Fallen.*

235. *EPHYDRA BORBOROIDES*, n. s. *Fæm.* Nigra, lata, crassa, pubescens, subsetosa, antennis piceis, arista pubescente, tibiis tarsisque flavo fasciatis, alis nigricantibus latiusculis cinerascente sexguttatis.

Female. Black, broad, thick, somewhat pubescent and with a few bristles ; antennæ piceous, short, 3rd joint round, arista pubescent ; abdomen broader than the thorax ; legs rather setose, tibiæ and tarsi with yellow bands ; wings blackish, rather broad, with about six greyish dots on each ; veins black ; posterior longitudinal veins abbreviated ; discal transverse vein parted by more than twice its length from the border, and by less than its length from the præbrachial transverse. Length of the body $1\frac{1}{2}$ line ; of the wings 3 lines.

236. *EPHYDRA MACULICORNIS*, n. s. *Mas.* Cinereo-nigra, capite antennisque rufis, his puncto nigro, arista nuda, abdomine nigro nitente, tarsis testaceis, alis cinereis apud costam pubescentibus.

Male. Cinereous black ; head red in front and about the eyes ; antennæ red, 3rd joint round with a black point above ; arista short, simple ; abdomen oval, black, shining, not longer than the thorax ; tarsi testaceous ; wings grey, minutely pubescent along the border ; veins black ; discal transverse vein straight, oblique, parted by more than twice its length from the border and from the præbrachial transverse ; halteres piceous. Length of the body 2 lines ; of the wings 4 lines.

Gen. OCHTHERA, *Latr.*

237. *OCHTHERA INNOTATA*, n. s. *Fæm.* Cinereo-nigra, capite antico flavescenti-albo, pectore pedibusque cinereis, abdomine cyanescenti-nigro, alis cinereis, halteribus albidis.

Female. Cinereous black ; head yellowish white in front, silvery white hindward ; pectus and legs cinereous ; abdomen bluish black ; wings

grey; veins black; pobrachial vein forming an obtuse angle at its junction with the discal transverse vein, the latter very oblique, parted by little more than half its length from the border, and by nearly thrice its length from the præbrachial transverse; halteres whitish. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

Fam. PHORIDÆ, *Haliday*.

Gen. PHORA, *Latr.*

238. PHORA BIFASCIATA, n. s. *Fam.* Atræ, subtus flavescenti-alba, antennis fulvis, abdomine lanceolato, fasciis duabus apice pedibus halteribusque flavescenti-albis, pedibus posticis nigris basi flavescenti-albis, tarsis intermediis nigricantibus, alis cinereis.

Female. Deep black, yellowish white beneath; antennæ tawny; abdomen lanceolate, much longer than the thorax; sides elevated, a broad basal yellowish white band, and a narrower one beyond the middle, tip also yellowish white; anterior legs and halteres yellowish white, middle tarsi blackish, hind femora with the basal half yellowish white; wings cinereous, veins black, pale at the base; costal vein ending at a little beyond half the length of the wing; radial cubital, præbrachial, and pobrachial veins parallel and equally distinct. Length of the body $2-2\frac{1}{2}$ lines; of the wings 5-6 lines.

On the Zoological Geography of the Malay Archipelago. By ALFRED R. WALLACE, Esq. Communicated by CHARLES DARWIN, Esq., F.R.S. & L.S.

[Read Nov. 3rd, 1859.]

IN Mr. Sclater's paper on the Geographical Distribution of Birds, read before the Linnean Society, and published in the 'Proceedings' for February 1858, he has pointed out that the western islands of the Archipelago belong to the Indian, and the eastern to the Australian region of Ornithology. My researches in these countries lead me to believe that the same division will hold good in every branch of Zoology; and the object of my present communication is to mark out the precise limits of each region, and to call attention to some inferences of great general importance as regards the study of the laws of organic distribution.

The Australian and Indian regions of Zoology are very strongly contrasted. In one the Marsupial order constitutes the great mass of the mammalia,—in the other not a solitary marsupial animal exists. Marsupials of at least two genera (*Cuscus* and *Belideus*) are found all over the Moluccas and in Celebes; but none have

been detected in the adjacent islands of Java and Borneo. Of all the varied forms of *Quadrumanæ*, *Carnivora*, *Insectivora* and *Ruminantia* which abound in the western half of the Archipelago, the only genera found in the Moluccas are *Paradoxurus* and *Cervus*. The *Sciuridæ*, so numerous in the western islands, are represented in Celebes by only two or three species, while not one is found further east. Birds furnish equally remarkable illustrations. The Australian region is the richest in the world in Parrots; the Asiatic is (of tropical regions) the poorest. Three entire families of the Psittacine order are peculiar to the former region, and two of them, the Cockatoos and the Lories, extend up to its extreme limits, without a solitary species passing into the Indian islands of the Archipelago. The genus *Palæornis* is, on the other hand, confined with equal strictness to the Indian region. In the Rasorial order, the *Phasianidæ* are Indian, the *Megapodiidæ* Australian; but in this case one species of each family just passes the limits into the adjacent region. The genus *Tropidorhynchus*, highly characteristic of the Australian region, and everywhere abundant as well in the Moluccas and New Guinea as in Australia, is quite unknown in Java and Borneo. On the other hand, the entire families of *Bucconidæ*, *Trogonidæ* and *Phyllornithidæ*, and the genera *Pericrocotus*, *Picnonotus*, *Trichophorus*, *Ixos*, in fact, almost all the vast family of Thrushes and a host of other genera, cease abruptly at the eastern side of Borneo, Java, and Bali. All these groups are common birds in the great Indian islands; they abound everywhere; they are the characteristic features of the ornithology; and it is most striking to a naturalist, on passing the narrow straits of Macassar and Lombock, suddenly to miss them entirely, together with the *Quadrumanæ* and *Felidæ*, the *Insectivora* and *Rodentia*, whose varied species people the forests of Sumatra, Java, and Borneo.

To define exactly the limits of the two regions where they are (geographically) most intimately connected, I may mention that during a few days' stay in the island of Bali I found birds of the genera *Copsychus*, *Megalaima*, *Tiga*, *Ploceus*, and *Sturnopastor*, all characteristic of the Indian region and abundant in Malacca, Java, and Borneo; while on crossing over to Lombock, during three months collecting there, not one of them was ever seen; neither have they occurred in Celebes nor in any of the more eastern islands I have visited. Taking this in connexion with the fact of *Cacatua*, *Tropidorhynchus*, and *Megapodius* having their western limit in Lombock, we may consider it established that the Strait of Lombock

(only 15 miles wide) marks the limits and abruptly separates two of the great Zoological regions of the globe. The Philippine Islands are in some respects of doubtful location, resembling and differing from both regions. They are deficient in the varied Mammals of Borneo, but they contain no Marsupials. The Psittaci are scarce, as in the Indian region; the Lories are altogether absent, but there is one representative of the Cockatoos. Woodpeckers, Trogons, and the genera *Ixos*, *Copsychus*, and *Ploceus* are highly characteristic of India. *Tanysiptera* and *Megapodius*, again, are Australian forms, but these seem represented by only solitary species. The islands possess also a few peculiar genera. We must on the whole place the Philippine Islands in the Indian region, but with the remark that they are deficient in some of its most striking features. They possess several isolated forms of the Australian region, but by no means sufficient to constitute a real transition thereto.

Leaving the Philippines out of the question for the present, the western and eastern islands of the Archipelago, as here divided, belong to regions more distinct and contrasted than any other of the great zoological divisions of the globe. South America and Africa, separated by the Atlantic, do not differ so widely as Asia and Australia: Asia with its abundance and variety of large Mammals and no Marsupials, and Australia with scarcely anything but Marsupials; Asia with its gorgeous *Phasianidæ*, Australia with its dull-coloured *Megapodiidæ*; Asia the poorest tropical region in Parrots, Australia the richest: and all these striking characteristics are almost unimpaired at the very limits of their respective districts; so that in a few hours we may experience an amount of zoological difference which only weeks or even months of travel will give us in any other part of the world!

Moreover there is nothing in the aspect or physical character of the islands to lead us to expect such a difference; their physical and geological differences do not coincide with the zoological differences. There is a striking homogeneity in the two halves of the Archipelago. The great volcanic chain runs through both parts; Borneo is the counterpart of New Guinea; the Philippines closely resemble the equally fertile and equally volcanic Moluccas; while in eastern Java begins to be felt the more arid climate of Timor and Australia. But these resemblances are accompanied by an extreme zoological diversity, the Asiatic and Australian regions finding in Borneo and New Guinea respectively their highest development.

But it may be said: "The separation between these two regions is not so absolute. There *is* some transition. There *are* species and genera common to the eastern and western islands." This is true, yet (in my opinion) proves no transition in the proper sense of the word; and the nature and amount of the resemblance only shows more strongly the absolute and original distinctness of the two divisions. The exception here clearly proves the rule.

Let us investigate these cases of supposed transition. In the western islands almost the only instance of a group peculiar to Australia and the eastern islands is the *Megapodius* in North-west Borneo. Not one of the Australian forms of Mammalia passes the limits of the region. On the other hand, *Quadrupana* occur in Celebes, Batchian, Lombock, and perhaps Timor; Deer have reached Celebes, Timor, Buru, Ceram, and Gilolo, but not New Guinea; Pigs have extended to New Guinea, probably the true eastern limit of the genus *Sus*; Squirrels are found in Celebes, Lombock, and Sumbawa: among birds, *Gallus* occurs in Celebes and Sumbawa, Woodpeckers reach Celebes, and Hornbills extend to the North-west of New Guinea. These cases of identity or resemblance in the animals of the two regions we may group into three classes; 1st, identical species; 2nd, closely allied or representative species; and 3rd, species of peculiar and isolated genera. The common Grey Monkey (*Macacus cynomolgus*) has reached Lombock, and perhaps Timor, but not Celebes. The Deer of the Moluccas seems to be a variety of the *Cervus rufus* of Java and Borneo. The Jungle Cock of Celebes and Lombock is a Javanese species. *Hirundo javanica*, *Zosterops flavus*, *Halcyon collaris*, *Eurystomus gularis*, *Macropygia phasianella*, *Merops javanicus*, *Anthreptes lepida*, *Ptilonopus melanocephala*, and some other birds appear the same in the adjacent islands of the eastern and western divisions, and some of them range over the whole Archipelago. But after reading Lyell on the various modes of dispersion of animals, and looking at the proximity of the islands, we shall feel astonished, not at such an amount of interchange of species (most of which are birds of great powers of flight), but rather that in the course of ages a much greater and almost complete fusion has not taken place. Were the Atlantic gradually to narrow till only a strait of twenty miles separated Africa from South America, can we help believing that many birds and insects and some few mammals would soon be interchanged? But such interchange would be a fortuitous mixture of faunas essentially and absolutely dissimilar, not a natural and regular transition from

one to the other. In like manner the cases of identical species in the eastern and western islands of the Archipelago are due to the gradual and accidental commingling of originally absolutely distinct faunas.

In our second class (representative species) we must place the Wild Pigs, which seem to be of distinct but closely allied species in each island; the Squirrels also of Celebes are of peculiar species, as are the Woodpeckers and Hornbills, and two Celebes birds of the Asiatic genera *Phœnicophæus* and *Acridotheres*. Now these and a few more of like character are closely allied to other species inhabiting Java, Borneo, or the Philippines. We have only therefore to suppose that the species of the western passed over to the eastern islands at so remote a period as on one side or the other to have become extinct, and to have been replaced by an allied form, and we shall have produced exactly the state of things now existing. Such extinction and such replacement we know has been continually going on. Such has been the regular course of nature for countless ages in every part of the earth of which we have geological records; and unless we are prepared to show that the Indo-Australian Archipelago was an altogether exceptional region, such must have been the course of nature here also. If these islands have existed in their present form only during one of the later divisions of the Tertiary period, and if interchange of species at very rare and distant intervals has occurred, then the fact of some identical and other closely allied species is a necessary result, even if the two regions in question had been originally peopled by absolutely distinct creations of organic beings, and there had never been any closer connexion between them than now exists. The occurrence of a limited number of representative species in the two divisions of the Archipelago does not therefore prove any true transition from one to the other.

The examples of our third class—of peculiar genera having little or no affinity with those of the adjacent islands—are almost entirely confined to Celebes, and render that island a district *per se*, in the highest degree interesting. *Cynopithecus*, a genus of Baboons, the extraordinary Babirusa and the singular ruminant *Ansa depressicornis* have nothing in common with Asiatic mammals, but seem more allied to those of Africa. A quadrumanous animal of the same genus (perhaps identical) occurs in the little island of Bat-chian, which forms the extreme eastern limit of the highest order of mammalia. An allied species is also said to exist in the Philippines. Now this occurrence of quadrumana in the Australian

region proves nothing whatever as regards a transition to the western islands, which, among their numerous monkeys and apes, have nothing at all resembling them. The species of Celebes and Batchian have the high superorbital ridge, the long nasal bone, the dog-like figure, the minute erect tail, the predaceous habits and the fearless disposition of the true Baboons, and find their allies nowhere nearer than in tropical Africa. The *Anoa* seems also to point towards the same region, so rich in varied forms of Antelopes.

In the class of birds, Celebes possesses a peculiar genus of Parrots (*Prioniturus*), said to occur also in the Philippines; *Meropogon*, intermediate between an Indian and an African form of Bee-eaters; and the anomalous *Scissirostrum*, which Prince Bonaparte places next to a Madagascar bird, and forms a distinct subfamily for the reception of the two. Celebes also contains a species of *Coracias*, which is here quite out of its normal area, the genus being otherwise confined to Africa and continental India, not occurring in any other part of the Archipelago. The Celebes bird is placed, in Bonaparte's 'Conspectus,' between two African species, to which therefore I presume it is more nearly allied than to those of India. Having just received Mr. Smith's Catalogue of the Hymenoptera collected during my first residence in Celebes, I find in it some facts of an equally singular nature. Of 103 species, only 16 are known to inhabit any of the western islands of the Archipelago, while 18 are identical with species of continental India, China, and the Philippine Islands, two are stated to be identical with insects hitherto known only from tropical Africa, and another is said to be most closely allied to one from the Cape.

These phenomena of distribution are, I believe, the most anomalous yet known, and in fact altogether unique. I am aware of no other spot upon the earth which contains a number of species, in several distinct classes of animals, the nearest allies to which do not exist in any of the countries which on every side surround it, but which are to be found only in another primary division of the globe, separated from them all by a vast expanse of ocean. In no other case are the species of a genus or the genera of a family distributed in *two* distinct areas separated by countries in which they do not exist; so that it has come to be considered a law in geographical distribution, "that both species and groups inhabit continuous areas."

Facts such as these can only be explained by a bold acceptance of vast changes in the surface of the earth. They teach us that this island of Celebes is more ancient than most of the islands

now surrounding it, and obtained some part of its fauna before they came into existence. They point to the time when a great continent occupied a portion at least of what is now the Indian Ocean, of which the islands of Mauritius, Bourbon, &c. may be fragments, while the Chagos Bank and the Keeling Atolls indicate its former extension eastward to the vicinity of what is now the Malayan Archipelago. The Celebes group remains the last eastern fragment of this now submerged land, or of some of its adjacent islands, indicating its peculiar origin by its zoological isolation, and by still retaining a marked affinity with the African fauna.

The great Pacific continent, of which Australia and New Guinea are no doubt fragments, probably existed at a much earlier period, and extended as far westward as the Moluccas. The extension of Asia as far to the south and east as the Straits of Macassar and Lombeck must have occurred subsequent to the submergence of both these great southern continents; and the breaking up and separation of the islands of Sumatra, Java, and Borneo has been the last great geological change these regions have undergone. That this has really taken place as here indicated, we think is proved by the following considerations. Not more than twenty (probably a smaller number) out of about one hundred land birds of Celebes at present known are found in Java or Borneo, and only one or two of twelve or fifteen Mammalia. Of the Mammalia and birds of Borneo, however, at least three-fourths, probably five-sixths, inhabit also Java, Sumatra, or the peninsula of Malacca. Now, looking at the direction of the Macassar Straits running nearly north and south, and remembering we are in the district of the monsoons, a steady south-east and north-west wind blowing alternately for about six months each, we shall at once see that Celebes is more favourably situated than any other island to receive stray passengers from Borneo, whether drifted across the sea or wafted through the air. The distance too is less than between any of the other large islands; there are no violent currents to neutralize the action of the winds; and numerous islets in mid-channel offer stations which might rescue many of the wanderers, and admit, after repose, of fresh migrations. Between Java and Borneo the width of sea is much greater, the intermediate islands are fewer, and the direction of the monsoons *along* and not *across* the Java sea, accompanied by alternating currents in the same direction, must render accidental communication between the two islands exceedingly difficult; so that where the facilities for intercommunication are greatest, the number of species common to the two

countries is least, and *vice versa*. But again, the mass of the species of Borneo, Java, &c., even when not *identical* are *congeneric*, which, as before explained, indicates *identity* at an earlier epoch; whereas the great mass of the fauna of Celebes is widely different from that of the western islands, consisting mostly of genera, and even of entire families, altogether foreign to them. This clearly points to a former total diversity of forms and species,—existing similarities being the result of intermixture, the extreme facilities for which we have pointed out. In the case of the great western islands a former more complete identity is indicated, the present differences having arisen from their isolation during a considerable period, allowing time for that partial extinction and introduction of species which is the regular course of nature. If the very small number of western species in Celebes is all that the most favourable conditions for transmission could bring about, the complete similarity of the faunas of the western islands could never (with far less favourable conditions) have been produced by the same means. And what other means can we conceive but the former connexion of those islands with each other and with the continent of Asia?

In striking confirmation of this view we have physical evidence of a very interesting nature. These countries are in fact *still connected*, and that so completely that an elevation of only 300 feet would nearly double the extent of tropical Asia. Over the whole of the Java Sea, the Straits of Malacca, the Gulf of Siam, and the southern part of the China Sea, ships can anchor in less than fifty fathoms. A vast submarine plain unites together the apparently disjointed parts of the Indian zoological region, and abruptly terminates, exactly at its limits, in an unfathomable ocean. The deep sea of the Moluccas comes up to the very coasts of Northern Borneo, to the Strait of Lombok in the south, and to near the middle of the Strait of Macassar. May we not therefore from these facts very fairly conclude that, according to the system of alternate bands of elevation and depression that seems very generally to prevail, the last great rising movement of the volcanic range of Java and Sumatra was accompanied by the depression that now separates them from Borneo and from the continent?

It is worthy of remark that the various islands of the Moluccas, though generally divided by a less extent of sea, have fewer species in common; but the separating seas are in almost every case of immense depth, indicating that the separation took place at a much earlier period. The same principle is well illustrated by the dis-

tribution of the genus *Paradisea*, two species of which (the common Birds of Paradise) are found only in New Guinea and the islands of Aru, Mysol, Waigiou, and Jobie, all of which are connected with New Guinea by banks of soundings, while they do not extend to Ceram or the Ké Islands, which are no further from New Guinea, but are separated from it by deep sea. Again, the chain of small volcanic islands to the west of Gilolo, though divided by channels of only ten or fifteen miles wide, possess many distinct representative species of insects, and even, in some cases, of birds also. The Baboons of Batchian have not passed to Gilolo, a much larger island, only separated from it by a channel ten miles wide, and in one part almost blocked up with small islands.

Now looking at these phenomena of distribution, and especially at those presented by the fauna of Celebes, it appears to me that a much exaggerated effect, in producing the present distribution of animals, has been imputed to the accidental transmission of individuals across intervening seas; for we have here as it were a test or standard by which we may measure the possible effect due to these causes, and we find that, under conditions perhaps the most favourable that exist on the globe, the percentage of species derived from this source is extremely small. When my researches in the Archipelago are completed, I hope to be able to determine with some accuracy this numerical proportion in several cases; but in the mean time we will consider 20 per cent. as the probable maximum for birds and mammals which in Celebes have been derived from Borneo or Java.

Let us now apply this standard to the case of Great Britain and the Continent, in which the width of dividing sea and the extent of opposing coasts are nearly the same, but in which the species are almost all identical,—or to Ireland, more than 90 per cent. of whose species are British,—and we shall at once see that no theory of transmission across the present Straits is admissible, and shall be compelled to resort to the idea of a very recent separation (long since admitted), to account for these zoological phenomena.

It is, however, to the oceanic islands that we consider the application of this test of the most importance. Let any one try to realize the comparative facilities for the transmission of organized beings across the Strait of Macassar from Borneo to Celebes, and from South Europe or North Africa to the island of Madeira, at least four times the distance, and a mere point in the ocean, and he would probably consider that in a given period a hundred cases of transmission would be more likely to occur in the former case

than one in the latter. Yet of the comparatively rich insect-fauna of Madeira, 40 per cent. are continental species; and of the flowering plants more than 60 per cent. The Canary Islands offer nearly similar results. Nothing but a former connexion with the Continent will explain such an amount of specific identity (the weight of which will be very much increased if we take into account the representative species); and the direction of the Atlas range towards Teneriffe, and of the Sierra Nevada towards Madeira, are material indications of such a connexion.

The Galapagos are no further from South America than Madeira is from Europe, and, being of greater extent, are far more liable to receive chance immigrants; yet they have hardly a species identical with any inhabiting the American continent. These islands therefore may well have originated in mid-ocean; or if they ever were connected with the mainland, it was at so distant a period that the natural extinction and renewal of species has left not one in common. The character of their fauna, however, is more what we should expect to arise from the chance introduction of a very few species at distant intervals; it is very poor; it contains but few genera, and those scattered among unconnected families; its genera often contain several closely allied species, indicating a single antitype.

The fauna and flora of Madeira and of the Canaries, on the other hand, have none of this chance character. They are comparatively rich in genera and species; most of the principal groups and families are more or less represented; and, in fact, these islands do not differ materially, as to the general character of their animal and vegetable productions, from any isolated mountain in Europe or North Africa of about equal extent.

On exactly the same principles, the very large number of species of plants, insects, and birds, in Europe and North America, either absolutely identical or represented by very closely allied species, most assuredly indicates that some means of land communication in temperate or sub-arctic latitudes existed at no very distant geological epoch; and though many naturalists are inclined to regard all such views as vague and unprofitable speculations, we are convinced they will soon take their place among the legitimate deductions of science.

Geology can detect but a portion of the changes the surface of the earth has undergone. It can reveal the past history and mutations of what is now dry land; but the ocean tells nothing of her bygone history. Zoology and Botany here come to the aid of

their sister science, and by means of the humble weeds and despised insects inhabiting its now distant shores, can discover some of those past changes which the ocean itself refuses to reveal. They can indicate, approximately at least, where and at what period former continents must have existed, from what countries islands must have been separated, and at how distant an epoch the rupture took place. By the invaluable indications which Mr. Darwin has deduced from the structure of coral reefs, by the surveys of the ocean-bed now in progress, and by a more extensive and detailed knowledge of the geographical distribution of animals and plants, the naturalist may soon hope to obtain some idea of the continents which have now disappeared beneath the ocean, and of the general distribution of land and sea at former geological epochs.

Most writers on geographical distribution have completely overlooked its connexion with well-established geological facts, and have thereby created difficulties where none exist. The peculiar and apparently endemic faunæ and floræ of the oceanic islands (such as the Galapagos and St. Helena) have been dwelt upon as something anomalous and inexplicable. It has been imagined that the more simple condition of such islands would be to have their productions identical with those of the nearest land, and that their actual condition is an incomprehensible mystery. The very reverse of this is however the case. We really require no speculative hypothesis, no new theory, to explain these phenomena; they are the logical results of well-known laws of nature. The regular and unceasing extinction of species, and their replacement by allied forms, is now no hypothesis, but an established fact; and it necessarily produces such peculiar faunæ and floræ in all but recently formed or newly disrupted islands, subject of course to more or less modification according to the facilities for the transmission of fresh species from adjacent continents. Such phenomena therefore are far from uncommon. Madagascar, Mauritius, the Moluccas, New Zealand, New Caledonia, the Pacific Islands, Juan Fernandez, the West India Islands, and many others, all present such peculiarities in greater or less development. It is the instances of identity of species in distant countries that presents the real difficulty. What was supposed to be the more normal state of things is really exceptional, and requires some hypothesis for its explanation. The phenomena of distribution in the Malay Archipelago, to which I have here called attention, teach us that, however narrow may be the strait separating an island from its con-

continent, it is still an impassable barrier against the passage of any considerable number and variety of land animals; and that in all cases in which such islands possess a tolerably rich and varied fauna of species mostly identical, or closely allied with those of the adjacent country, we are forced to the conclusion that a geologically recent disruption has taken place. Great Britain, Ireland, Sicily, Sumatra, Java and Borneo, the Aru Islands, the Canaries and Madeira, are cases to which the reasoning is fully applicable.

In his introductory Essay on the Flora of New Zealand, Dr. Hooker has most convincingly applied this principle to show the former connexion of New Zealand and other southern islands with the southern extremity of America; and I will take this opportunity of calling the attention of zoologists to the very satisfactory manner in which this view clears away many difficulties in the distribution of animals. The most obvious of these is the occurrence of Marsupials in America only, beyond the Australian region. They evidently entered by the same route as the plants of New Zealand and Tasmania which occur in South temperate America, but having greater powers of dispersion, a greater plasticity of organization, have extended themselves over the whole continent though with so few modifications of form and structure as to point to a unity of origin at a comparatively recent period. It is among insects, however, that the resemblances approach in number and degree to those exhibited by plants. Among Butterflies the beautiful *Heliconidæ* are strictly confined to South America, with the exception of a single genus (*Hamadryas*) found in the Australian region from New Zealand to New Guinea. In Coleoptera many families and genera are characteristic of the two countries; such are *Pseudomorphidæ* among the Geodephaga, *Lamprimidæ* and *Syndesidæ* among the Lucani, *Anoplognathidæ* among the Lamellicornes, *Stigmoderidæ* among the Buprestes, *Natalis* among the Cleridæ, besides a great number of representative genera. This peculiar distribution has hitherto only excited astonishment, and has confounded all ideas of unity in the distribution of organic beings; but we now see that they are in exact accordance with the phenomena presented by the flora of the same regions, as developed in the greatest detail by the researches of Dr. Hooker.

It is somewhat singular, however, that not one *identical species* of insect should yet have been discovered, while no less than 89 species of flowering plants are found both in New Zealand and South America. The relations of the animals and of the plants

of these countries must necessarily depend on the same physical changes which the Southern hemisphere has undergone; and we are therefore led to conclude that insects are much less persistent in their specific forms than flowering plants, while among Mammalia and land birds (in which no genus even is common to the countries in question) species must die and be replaced much more rapidly than in either. And this is exactly in accordance with the fact (well established by geology) that at a time when the shells of the European seas were almost all identical with species now living, the European Mammalia were almost all different. The duration of life of species would seem to be in an inverse proportion to their complexity of organization and vital activity.

In the brief sketch I have now given of this interesting subject, such obvious and striking facts alone have been adduced as a traveller's note-book can supply. The argument must therefore lose much of its weight from the absence of detail and accumulated examples. There is, however, such a very general accordance in the phenomena of distribution as separately deduced from the various classes or kingdoms of the organic world, that whenever one class of animals or plants exhibits in a clearly marked manner certain relations between two countries, the other classes will certainly show similar ones, though it may be in a greater or a less degree. Birds and insects will teach us the same truths; and even animals and plants, though existing under such different conditions, and multiplied and dispersed by such a generally distinct process, will never give conflicting testimony, however much they may differ as regards the amount of relationship between distant regions indicated by them, and consequently notwithstanding the greater or less weight either may have in the determining of questions of this nature.

This is my apology for offering to the Linnean Society the present imperfect outline in anticipation of the more detailed proofs and illustrations which I hope to bring forward on a future occasion.

INDEX.

	Page		Page
Acridotheres	176	Aye-Aye (<i>Cheiomys madagascariensis</i> , L., Cuv.) H. Sandwith on the habits of the	28
Alligator	3	Babirusa	176
Amblada, <i>Walk.</i>	144	Baccha, <i>Fabr.</i>	121
— atomaria, <i>Walk.</i>	145	— dispar, <i>Walk.</i>	121
Ampsalis, <i>Walk.</i>	98	Baryterocera, <i>Walk.</i>	120
— geniata, <i>Walk.</i>	99	— gibbula, <i>Walk.</i>	120
Ancylus fluviatilis	39	Belideus	172
Anoa	177	Bombylidæ, <i>Leach</i>	111
Anodon	38	Bombylites, <i>Walk.</i>	111
Anomia	37, 58	Buccinum	41, 69
Anopheles, <i>Meigen</i>	91	Bucconidæ	173
— vanus, <i>Walk.</i>	91	Bulla	66
Anoplognathidæ	183	Cacatua	173
Ansa depressicornis	176	Cadrema, <i>Walk.</i>	117
Anthomyia, <i>Meigen</i>	141	— lonchopteroides, <i>Walk.</i>	117
— procellaria, <i>Walk.</i>	141	Cænosia, <i>Meigen</i>	141
Anthomyides, <i>Walk.</i>	140	— luteicornis, <i>Walk.</i>	141
Anthrax, <i>Fabr.</i>	111	— respondens, <i>Walk.</i>	142
— antecedens, <i>Walk.</i>	111	— signata, <i>Walk.</i>	142
— congrua, <i>Walk.</i>	112	Caiman	3
— degenera, <i>Walk.</i>	113	Callantra, <i>Walk.</i>	153
— demonstrans, <i>Walk.</i>	112	— smieroides, <i>Walk.</i>	154
— prædicans, <i>Walk.</i>	112	Calobata, <i>Fabr.</i>	161
— prætendens, <i>Walk.</i>	111	— bifasciata, <i>Walk.</i>	162
— proferens, <i>Walk.</i>	113	— impingens, <i>Walk.</i>	161
— semiscita, <i>Walk.</i>	111	— resoluta, <i>Walk.</i>	161
— Tantalus, <i>Fabr.</i>	111	Calyptrea	39
Anthreptes lepida	175	Cardiacephala, <i>Macq.</i>	162
Aplysia	38, 40	— varipes, <i>Walk.</i>	162
Aragara, <i>Walk.</i>	154	Cardium	48
— crassipes, <i>Walk.</i>	154	Celyphus, <i>Dalman</i>	147
Arca	55	— obtectus, <i>Dalman</i>	147
Argonauta	42, 60	— scutatus, <i>Wied.</i>	147
Aricia, <i>Macq.</i>	140	Ceria, <i>Fabr.</i>	118
— contraria, <i>Walk.</i>	140	— lateralis, <i>Walk.</i>	118
— integra, <i>Walk.</i>	140	Cervus	173
— nigricosta, <i>Walk.</i>	140	Chama	54
— significans, <i>Walk.</i>	140	Chrysops, <i>Meigen</i>	104
Asilidæ, <i>Leach</i>	104	— fasciatus, <i>Wied.</i>	104
Asilites, <i>Walk.</i>	106	Chrysotus, <i>Meigen</i>	116
Asilus, <i>Linn.</i>	107	— exactus, <i>Walk.</i>	116
— areolaris, <i>Walk.</i>	108	Cleodora	42
— determinatus, <i>Walk.</i>	107	Cleridæ	183
— introducens, <i>Walk.</i>	108	Clitellaria, <i>Meigen</i>	95
— tenuicornis, <i>Walk.</i>	108		
Aspergillum	36		

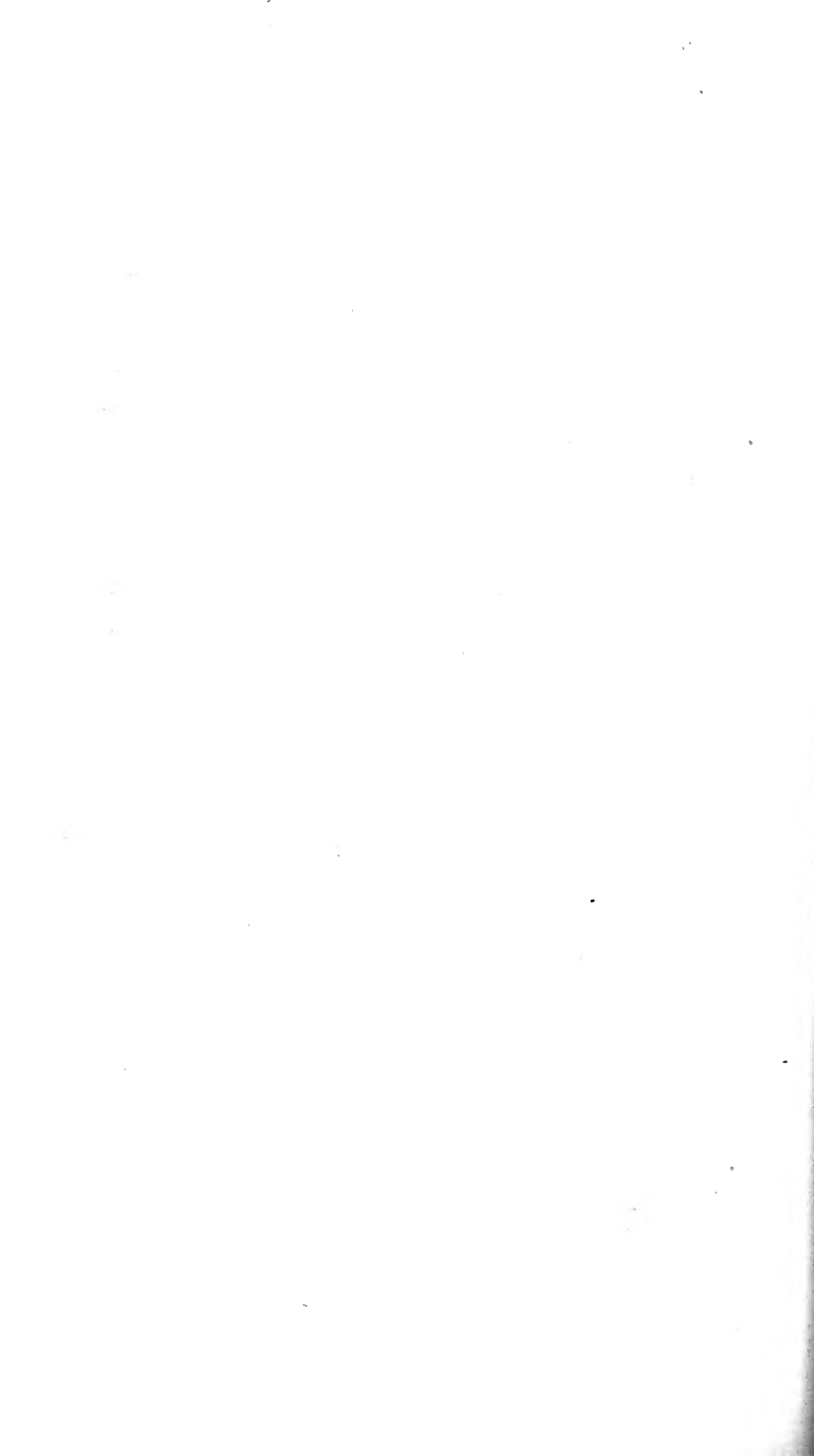
	Page		Page
<i>Clitellaria festinans</i> , <i>Walk.</i>	95	<i>Dexides</i> , <i>Walk.</i>	129
— <i>gavisa</i> , <i>Walk.</i>	95	<i>Diaphorus</i> , <i>Meigen</i>	117
<i>Cœnurgia</i> , <i>Walk.</i>	164	— <i>resumens</i> , <i>Walk.</i>	117
— <i>remipes</i> , <i>Walk.</i>	164	<i>Diopsides</i> , <i>Walk.</i>	161
<i>Conus</i>	60	<i>Diopsis</i> , <i>Linn.</i>	161
<i>Copsychnus</i>	173, 174	— <i>detrehens</i> , <i>Walk.</i>	161
<i>Coracias</i>	177	— <i>subnotata</i> , <i>Westw.</i>	161
<i>Cordylura</i> , <i>Fallen</i>	142	Dipterous insects collected at Ma-	
— <i>bisignata</i> , <i>Walk.</i>	142	kassar, in Celebes, by Mr. A. R.	
<i>Crania</i>	37	Wallace, Catalogue of, by Francis	
<i>Crocodylia</i> . Prof. T. H. Huxley on		<i>Walker</i>	90
the specific and generic Charac-		<i>Discocephala</i> , <i>Macquart</i>	104
ters of	1	— <i>pandens</i> , <i>Walk.</i>	104
<i>Crocodylidæ</i>	5	<i>Discomyza</i> , <i>Meigen</i>	169
<i>Crocodylus</i>	6	— <i>obscurata</i> , <i>Walk.</i>	169
— <i>Americanus</i> (<i>acutus</i> , <i>Cuv.</i>)	11	<i>Dolichopidæ</i> , <i>Leach</i>	114
— <i>biporcatus</i>	11	<i>Dolichopus</i> , <i>Latr.</i>	115
— <i>bombifrons</i>	13	— <i>cinereus</i> , <i>Walk.</i>	115
— <i>cataphractus</i>	16	— <i>prædicans</i> , <i>Walk.</i>	115
— <i>galeatus</i>	15	— <i>præmissus</i> , <i>Walk.</i>	116
— <i>Gravesii</i> (<i>planirostris</i>)	15	— <i>provectus</i> , <i>Walk.</i>	116
— <i>Journei</i>	11-16	— <i>proveniens</i> , <i>Walk.</i>	116
— <i>marginatus</i>	15	<i>Donax</i>	50
— <i>Morelettii</i>	28	<i>Doris</i>	40
— <i>rhombifer</i>	14	<i>Drosophila</i> , <i>Fallen</i>	168
— <i>Schlegelii</i>	16, 17	— <i>illata</i> , <i>Walk.</i>	168
— <i>suchus</i>	15	— <i>lateralis</i> , <i>Walk.</i>	169
— <i>vulgaris</i>	6	— <i>lurida</i> , <i>Walk.</i>	169
<i>Ctenophora</i> , <i>Fabr.</i>	93	— <i>rudis</i> , <i>Walk.</i>	168
— <i>incunctans</i> , <i>Walk.</i>	93	— <i>solenis</i> , <i>Walk.</i>	168
— <i>gaudens</i> , <i>Walk.</i>	93	<i>Enicoptera</i> , <i>Macq.</i>	155
<i>Culex</i> , <i>Linn.</i>	91	— <i>arcuosa</i> , <i>Walk.</i>	156
— <i>impatibilis</i> , <i>Walk.</i>	91	— <i>flava</i> , <i>Macq.</i>	156
— <i>impellens</i> , <i>Walk.</i>	91	— <i>pictipennis</i> , <i>Walk.</i>	155
— <i>obturans</i> , <i>Walk.</i>	91	— ? <i>plagifera</i> , <i>Walk.</i>	156
<i>Culicidæ</i> , <i>Haliday</i>	90	— <i>tortuosa</i> , <i>Walk.</i>	155
<i>Cuscus</i>	172	<i>Ephydra</i> , <i>Fallen</i>	171
<i>Cyclas</i>	38	— <i>borboroides</i> , <i>Walk.</i>	171
<i>Cynopithecus</i>	76	— <i>maculicornis</i> , <i>Walk.</i>	171
<i>Cypræa</i>	63	<i>Eristalis</i> , <i>Latr.</i>	119
<i>Cyrenoidea</i>	37	— <i>Æsopus</i> , <i>Walk.</i>	119
<i>Dacus</i> , <i>Fabr.</i>	149	— <i>bomboides</i> , <i>Walk.</i>	119
— <i>addens</i> , <i>Walk.</i>	149	— <i>crassus</i> , <i>Fabr.</i>	119
— <i>bilineatus</i> , <i>Walk.</i>	150	<i>Eumerus</i> , <i>Meigen</i>	121
— <i>contrahens</i> , <i>Walk.</i>	151	— <i>figurans</i> , <i>Walk.</i>	121
— <i>diffusus</i> , <i>Walk.</i>	153	<i>Eurygaster</i> , <i>Macq.</i>	125
— <i>divergens</i> , <i>Walk.</i>	149	— <i>apta</i> , <i>Walk.</i>	126
— <i>emittens</i> , <i>Walk.</i>	152	— <i>conglomerata</i> , <i>Walk.</i>	126
— <i>exigens</i> , <i>Walk.</i>	151	— <i>contracta</i> , <i>Walk.</i>	128
— <i>fulvitaris</i> , <i>Walk.</i>	153	— <i>deducens</i> , <i>Walk.</i>	127
— <i>imitans</i> , <i>Walk.</i>	150	— <i>progressa</i> , <i>Walk.</i>	128
— <i>inaptus</i>	151	— <i>prominens</i> , <i>Walk.</i>	127
— <i>terminifer</i> , <i>Walk.</i>	152	— <i>remittens</i> , <i>Walk.</i>	125
<i>Dasypogonites</i> , <i>Walk.</i>	104	— <i>ridibunda</i> , <i>Walk.</i>	125
<i>Delphinula</i>	41	<i>Eurystomus gularis</i>	175
<i>Dentalium</i>	36, 88	<i>Fissurella</i>	38
<i>Dexia</i> , <i>Meigen</i>	129	<i>Gallus</i>	175
— <i>basifera</i> , <i>Walk.</i>	129	Garner, Robert, on the Shell-	
— <i>includens</i> , <i>Walk.</i>	130	bearing Mollusca, particularly	
— <i>præcedens</i> , <i>Walk.</i>	131	with regard to structure and form	35

	Page		Page
Gavialidæ	16	Lispe bimaculata, <i>Walk.</i>	141
Gavialis	16, 20	Lobster Common (<i>Homarus vul-</i>	
— gangeticus	20	garis) and Shore Crab (<i>Carcinus</i>	
Gobrya, <i>Walk.</i>	166	Maenas), <i>S. J. A. Salter</i> on the	
— bacchoides, <i>Walk.</i>	166	Moulting of the	30
Graptomyza, <i>Wied.</i>	118	Lonchopteridæ, <i>Curtis</i>	117
— tibialis, <i>Walk.</i>	118	Lonchæa, <i>Fallen</i>	145
Halcyon collaris	175	— ? atratula	146
Haliotis	87	— ? consentanea	146
Hamadryas	183	Lymnæus	41
Hanley, Sylvanus, on the Linnean		Macacus	175
Manuscript of the 'Museum Ul-		Macropygia phasianella	175
ricæ'	43	Magilus	40
Heliconidæ	183	Malay Archipelago, <i>A. R. Wallace</i>	
Helix	83	on the Zoological Geography of	172
— aspersa	41	Marsupials	183
Helomyza, <i>Fallen</i>	143	Masicera, <i>Macq.</i>	123
— copiosa, <i>Walk.</i>	143	— dotata, <i>Walk.</i>	123
— observans, <i>Walk.</i>	143	— horrens, <i>Walk.</i>	124
— tripunctifera, <i>Walk.</i>	143	— immersa, <i>Walk.</i>	124
Helomyzides, <i>Fallen</i>	142	— prognosticans, <i>Walk.</i>	124
Helophilus, <i>Meigen</i>	119	Mecistops	15
— conclusus, <i>Walk.</i>	119	— Bennettii	16
— consors, <i>Walk.</i>	119	Megalania	173
Hermetia, <i>Latr.</i>	94	Megapodiidæ	173, 174
— remittens, <i>Walk.</i>	94	Megapodius	173, 174
Hirundo javanica	175	Megarhina, <i>Desvoidy</i>	90
Huxley, T. H., on the dermal Arm-		— immisericors, <i>Walk.</i>	90
our of <i>Jacare</i> and <i>Caiman</i> , with		Merodon, <i>Fabr.</i>	120
notes on the Specific and Generic		— interveniens, <i>Walk.</i>	120
Characters of recent Crocodilia .	1	Meropogon	177
Hyalæa	42	Merops javanicus	175
Hydromyzides, <i>Haliday</i>	170	Metopia, <i>Meigen</i>	128
Jacare	4	— inspectans, <i>Walk.</i>	128
— and Caiman, Prof. T. H.		— instruens, <i>Walk.</i>	129
<i>Huxley</i> on the dermal Armour of	1	Micropeza, <i>Macq.</i>	164
Idia, <i>Meigen</i>	132	— fragilis, <i>Walk.</i>	164
— australis, <i>Walk.</i>	132	Milesia, <i>Latr.</i>	118
— prolata, <i>Walk.</i>	133	— conspicienda, <i>Walk.</i>	118
Ixos	173, 174	Mollusca, shell-bearing, particu-	
Lamprimidæ	183	larly with regard to structure	
Lamprogaster, <i>Macq.</i>	147	and form, <i>Rob. Garner</i> on the .	35
— marginifera, <i>Walk.</i>	147	Murex	75
Laphria, <i>Fabr.</i>	105	Musca, <i>Linn.</i>	133
— complens, <i>Walk.</i>	106	— collecta, <i>Walk.</i>	139
— concludens, <i>Walk.</i>	105	— conducens, <i>Walk.</i>	138
— partita, <i>Walk.</i>	105	— delectans, <i>Walk.</i>	134
— requisita, <i>Walk.</i>	105	— domestica, <i>Walk.</i>	138
— Taphius, <i>Walk.</i>	105	— electa, <i>Walk.</i>	136
— Vulcanus, <i>Wied.</i>	105	— favillacea, <i>Walk.</i>	135
Laphrites, <i>Walk.</i>	105	— flaviceps, <i>Walk.</i>	135
Lauxanides, <i>Walk.</i>	145	— fortunata, <i>Walk.</i>	137
Leptidæ, <i>Westw.</i>	110	— gavis, <i>Walk.</i>	138
Leptis, <i>Fabr.</i>	110	— ingens, <i>Walk.</i>	134
Leptis ferruginosa, <i>Walk.</i>	110	— inscribens, <i>Walk.</i>	136
Leptogaster, <i>Meigen</i>	109	— intrahens, <i>Walk.</i>	137
— munda, <i>Walk.</i>	109	— obtrusa, <i>Walk.</i>	135
Limnobia, <i>Meigen</i>	92	— optata, <i>Walk.</i>	137
— imponens, <i>Walk.</i>	92	— prædicens, <i>Walk.</i>	139
Lispe, <i>Meigen</i>	141	— proferens, <i>Walk.</i>	138

	Page		Page
<i>Musca promittens, Walk.</i>	134	<i>Pericrocotus</i>	173
— <i>prospera, Walk.</i>	133	<i>Perna</i>	37
— <i>refixa, Walk.</i>	138	<i>Phasianidæ</i>	173, 174
— <i>selecta, Walk.</i>	135	<i>Phœnicophæus</i>	176
— <i>sperata, Walk.</i>	136	<i>Pholas</i>	86, 46
— <i>xanthomela, Walk.</i>	139	<i>Phora, Latr.</i>	17
<i>Muscidæ, Latr.</i>	122	— <i>bifasciata, Walk.</i>	172
<i>Muscides, Walk.</i>	132	<i>Phoridæ, Haliday</i>	172
<i>Museum Ulricæ, Sylvanus Hanley</i> on the Linnean manuscript of the	43	<i>Phyllornithidæ</i>	173
<i>Mya</i>	46	<i>Picnonotus</i>	173
<i>Mydas basifasciata, Walk.</i>	104	<i>Pinna</i>	60
<i>Mydasites, Walk.</i>	104	<i>Piophila, Fallen.</i>	167
<i>Mytilus</i>	58	— <i>contacta, Walk.</i>	167
— <i>edulis</i>	38	<i>Platyezidæ, Haliday</i>	117
<i>Natalis</i>	183	<i>Platyeza, Meigen</i>	117
<i>Natica</i>	41	— <i>glaucescens, Walk.</i>	117
<i>Nautilus</i>	60	<i>Platystoma, Latr.</i>	148
<i>Nemorea, Macq.</i>	122	— <i>atomarium, Walk.</i>	148
— <i>amplificans, Walk.</i>	122	— <i>basale, Walk.</i>	148
— <i>tenebrosa, Walk.</i>	123	<i>Ploceus</i>	173, 174
<i>Nerita</i>	85	<i>Prioniturus</i>	177
— <i>litoralis</i>	40	<i>Pseudomorphidæ</i>	183
<i>Nerius, Wied.</i>	164	<i>Psila, Meigen</i>	165
— <i>fuscipennis, Macq.</i>	164	— <i>bipunctifera, Walk.</i>	165
<i>Nerna, Walk.</i>	97	— <i>munda, Walk.</i>	166
— <i>impendens, Walk.</i>	97	<i>Psilides, Walk.</i>	164
<i>Nomba, Walk.</i>	169	<i>Psilopus, Meigen</i>	114
— <i>ticta, Walk.</i>	170	— <i>abruptus, Walk.</i>	115
<i>Notiphila, Fallen</i>	170	— <i>æstimatus, Walk.</i>	114
— <i>flavilinea, Walk.</i>	171	— <i>filifer, Walk.</i>	114
— <i>lineosa, Walk.</i>	170	— <i>spectabilis, Walk.</i>	114
— <i>quadrifascia, Walk.</i>	170	<i>Pterogenia, Bigot.</i>	147
<i>Ochthera, Latr.</i>	171	— <i>singularis, Bigot</i>	147
— <i>innotata, Walk.</i>	171	<i>Pteropoda</i>	42
<i>Ochthiphila, Fallen</i>	147	<i>Ptilocera, Wied.</i>	94
— <i>discoglauca, Walk.</i>	147	— <i>smaragdina, Walk.</i>	94
<i>Ommatius, Illiger</i>	109	— <i>smaragdifera, Walk.</i>	96
— <i>scitulus, Walk.</i>	109	<i>Philonotus melanocephala</i>	175
— <i>strictus, Walk.</i>	109	<i>Purpura</i>	41
<i>Opomyza, Fallen</i>	168	<i>Rhynchosuchus</i>	16
— <i>nigrifinis, Walk.</i>	168	<i>Rosapha, Walk.</i>	100
<i>Ortalides, Haliday</i>	147	— <i>habilis, Walk.</i>	100
<i>Ortalis, Fallen</i>	157	<i>Ruba, Walk.</i>	100
— <i>decatomoides, Walk.</i>	157	— <i>inflata, Walk.</i>	101
— <i>vacillans, Walk.</i>	157	<i>Salter, S. J. A., on the moulting</i> of the common Lobster and Shore-Crab	30
<i>Oscinides, Haliday</i>	167	<i>Sandwith, Hon. Dr. On the habits</i> of the Aye-Aye (<i>Cheiromys</i> <i>madagascariensis, Cuv.</i>)	28
<i>Oscinis, Fabr.</i>	167	<i>Sarcophaga, Meigen</i>	132
— <i>femorata, Walk.</i>	167	— <i>aliena, Walk.</i>	132
<i>Ostrea</i>	56	— <i>inextricata, Walk.</i>	132
<i>Ovula</i>	41	— <i>invaria, Walk.</i>	132
<i>Oxycera, Meigen</i>	96	— <i>mendax, Walk.</i>	132
— <i>manens, Walk.</i>	96	<i>Sarcophagides, Walk.</i>	132
<i>Palæornis</i>	173	<i>Sargus, Fabr.</i>	96
<i>Palloptera, Fallen</i>	160	— <i>inactus, Walk.</i>	97
— <i>detracta, Walk.</i>	160	— <i>mactans, Walk.</i>	97
<i>Paradisea</i>	180	— <i>redhibens, Walk.</i>	97
<i>Paradoxurus</i>	173		
<i>Patella</i>	38, 39, 87		
<i>Pecten maximus</i>	38		

	Page		Page
<i>Sargus remeans</i> , <i>Walk.</i>	96	<i>Tabanus spoliatus</i> , <i>Walk.</i>	103
— <i>repensans</i> , <i>Walk.</i>	96	— <i>succurvus</i> , <i>Walk.</i>	102
<i>Saruga</i> , <i>Walk.</i>	101	<i>Tachinides</i> , <i>Walk.</i>	122
— <i>conifera</i> , <i>Walk.</i>	102	<i>Tanysiptera</i>	174
<i>Sciomyza</i> , <i>Fallen</i>	144	<i>Tellina</i>	47
— (?) <i>leucomelana</i> , <i>Walk.</i>	144	<i>Texara</i> , <i>Walk.</i>	166
— <i>replena</i> , <i>Walk.</i>	144	— <i>diotrioides</i> , <i>Walk.</i>	166
<i>Scissirostrum</i>	177	<i>Thereva</i> , <i>Latr.</i>	111
<i>Sciuridæ</i>	173	— <i>congrua</i> , <i>Walk.</i>	111
<i>Sepedon</i> , <i>Latr.</i>	145	<i>Therevites</i> , <i>Walk.</i>	111
— <i>Javanensis</i>	145	<i>Thressa</i> , <i>Walk.</i>	146
<i>Sepia</i>	36, 39, 42	— <i>signifera</i> , <i>Walk.</i>	146
<i>Sepsides</i> , <i>Walk.</i>	161	<i>Tiga</i>	173
<i>Sepsis</i> , <i>Fallen</i>	163	<i>Tinda</i> , <i>Walk.</i>	101
— <i>fascipes</i> , <i>Walk.</i>	163	— <i>modifera</i> , <i>Walk.</i>	101
— <i>frontalis</i> , <i>Walk.</i>	163	<i>Tipula</i> , <i>Linn.</i>	92
— <i>revocans</i> , <i>Walk.</i>	163	— <i>infidens</i>	92
— <i>testacea</i> , <i>Walk.</i>	163	— <i>inordinans</i>	93
<i>Seraca</i> , <i>Walk.</i>	164	<i>Tipulidæ</i> , <i>Haliday</i>	92
— <i>signata</i> , <i>Walk.</i>	165	<i>Torocea</i> , <i>Walk.</i>	131
— <i>signifera</i> , <i>Walk.</i>	165	— <i>abdominalis</i> , <i>Walk.</i>	131
<i>Serpula</i>	89	<i>Tracana</i> , <i>Walk.</i>	99
<i>Sipphiidæ</i> , <i>Leach</i>	118	— <i>iterabilis</i> , <i>Walk.</i>	99
<i>Solemya</i>	37	<i>Trichophorus</i>	173
<i>Solen</i>	47	<i>Trigonia</i>	37
<i>Solva</i> , <i>Walk.</i>	98	<i>Trochus</i>	40, 80
— <i>inamœna</i> , <i>Walk.</i>	98	<i>Trogonidæ</i>	173
<i>Sophira</i> , <i>Walk.</i>	160	<i>Tropidorhynchus</i>	173
— <i>bistriga</i> , <i>Walk.</i>	160	<i>Trupanea</i> , <i>Macquart</i>	106
<i>Spilogaster</i> , <i>Macq.</i>	141	<i>Trupanea calorifica</i> , <i>Walk.</i>	107
— <i>xanthoceras</i> , <i>Walk.</i>	141	— <i>strenua</i> , <i>Walk.</i>	106
<i>Spondylus</i>	54	<i>Trypeta</i> , <i>Meigen</i>	158
<i>Stigmoderidæ</i>	183	— <i>amplipennis</i> , <i>Walk.</i>	159
<i>Stratiomidæ</i> , <i>Haliday</i>	94	— <i>approximans</i> , <i>Walk.</i>	160
<i>Stratiomys</i> , <i>Geoff.</i>	94	— <i>basifascia</i> , <i>Walk.</i>	158
— <i>finalis</i> , <i>Walk.</i>	94	— <i>lativentris</i> , <i>Walk.</i>	158
— <i>immiscens</i> , <i>Walk.</i>	94	— <i>nigrofascia</i> , <i>Walk.</i>	158
<i>Strombus</i>	73	— <i>stellipennis</i> , <i>Walk.</i>	159
<i>Sturnopastor</i>	173	<i>Turbo</i>	81
<i>Suragina</i> , <i>Walk.</i>	110	<i>Venus</i>	51
— <i>illucens</i> , <i>Walk.</i>	110	<i>Volucella</i> , <i>Geoff.</i>	120
<i>Sus</i>	175	— <i>decorata</i> , <i>Walk.</i>	120
<i>Synidesidæ</i>	183	<i>Voluta</i>	67
<i>Syritta</i> , <i>St. Farg.</i>	121	<i>Vulsella</i>	37
— <i>illucida</i> , <i>Walk.</i>	121	<i>Walker</i> , Francis, Catalogue of Dipterous Insects collected by Mr. A. R. Wallace at Makassar in Celebes	90
<i>Syrphus</i> , <i>Fabr.</i>	122	<i>Wallace</i> , A. R., on the Zoological Geography of the Malay Archipelago	172
— <i>consequens</i> , <i>Walk.</i>	122	<i>Xarnuta</i> , <i>Walk.</i>	142
<i>Systropus</i> , <i>Wied.</i>	113	— <i>leucotelus</i> , <i>Walk.</i>	142
— <i>sphegoides</i> , <i>Walk.</i>	113	<i>Zosterops flavus</i>	175
<i>Tabanidæ</i> , <i>Leach</i>	102		
<i>Tabanus</i> , <i>Linn.</i>	102		
— <i>factiosus</i> , <i>Walk.</i>	102		
— <i>flexilis</i> , <i>Walk.</i>	104		
— <i>immixtus</i> , <i>Walk.</i>	103		
— <i>reducens</i> , <i>Walk.</i>	103		

THE END.



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LIST OF PAPERS.

	Page
BENTHAM, GEORGE, Esq., F.L.S.	
Synopsis of <i>Legnotideæ</i> , a tribe of <i>Rhizophoraceæ</i>	65
Notice of the Re-discovery of the genus <i>Asteranthos</i> , Desf., by Mr. Spruce	80
BERKELEY, Rev. M. J., M.A., F.L.S.	
On some Tuberiform Vegetable Productions from China	102
DICKIE, E., Esq., M.D., A.L.S., Professor of Natural History, Queen's College, Belfast.	
Notes on Arctic Plants	109
DRESSER, CHRISTOPHER, Esq.	
Contributions to Organographic Botany	148
GRISEBACH, N., Professor of Botany in the University of Göttingen.	
Notes on <i>Abuta</i> , a genus of <i>Menispermæ</i>	108
HENFREY, Prof., F.R.S., F.L.S.	
Note on the Morphology of the <i>Balsaminaceæ</i>	159
LINDLEY, Professor, F.R.S., F.L.S., &c.	
Contributions to the Orchidology of India.—No. II.	1
A Note upon <i>Pseudocentrum</i> , a new genus of <i>Orchidaceæ</i>	63
MASTERS, MAXWELL T., Esq., Lecturer on Botany at St. George's Hospital, &c.	
On a new species of <i>Bellevalia</i> from Mount Ida	113

MUELLER, DR. FERDINAND, Government Botanist, Victoria, Australia.	
Monograph of the <i>Eucalypti</i> of Tropical Australia; with an Arrangement for the use of Colonists according to the Struc- ture of the Bark	81
Contributiones ad Acaciarum Australiæ Cognitionem.....	114
<i>Dennisonia</i> , <i>Barklya</i> , et <i>Laboucheria</i> ; genera floræ Australiæ nondum cognita	157
OLIVER, DANIEL, jun., Esq., F.L.S.	
The Indian Species of <i>Utricularia</i>	170
RALPH, THOMAS SHEARMAN, Esq., A.L.S.	
On the Arborescent Ferns of New Zealand	163
SPRUCE, RICHARD, Esq.	
On Five New Plants from Eastern Peru	191
WELWITSCH, DR. FREDERICK.	
Letters on the Vegetation of West Equinoctial Africa	150
INDEX.....	205

For title & contents, see previous Volume

JOURNAL OF THE PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

Letter from M. E. BOURGEOU, Botanist to Capt. PALLISER's
British North American Exploring Expedition. Addressed to
Sir W. J. HOOKER, F.R.S., F.L.S., and communicated by him.

[Read March 3rd, 1859.]

Fort Garry, Saskatchewan,
June 7th, 1858.

SIR,—As you received the first letter, sent from Fort Garry, I need not detain you with a description of the little collection I was enabled to make, while almost daily upon the rivers and lakes, hemmed in on all sides by dense forests, to the Fort just named.

I commenced my herborizations June 12th, upon the Ile Royale, situated on Lake Superior, where the vegetation had hardly commenced. The Alders and Willows were in flower on the banks of the island, and by their sides large banks of ice still existed under the rocks. This island is thoroughly wooded, and especially with two *Abies* (*alba* and *balsamifera*), *Betula papyracea*, and the *Thuja*. The same day we landed at the entrance of the Kaministiquia River, Fort William; but the shortness of the stay did not enable me to make excursions in that place. From that time it was only during the hours of rest and at the portages that I could gather a few specimens; the indifferent accommodation in our boat did not permit of a large collection being made, from the difficulty of preserving it from damp. I have been delighted to learn that you have received the plants in a good state of pre-

servation, and I hope that this year also you will receive a pretty large quantity, and a good number of each species.

As you are geographically acquainted with the route of the expedition, I need not speak concerning the localities through which we have passed; the specimens of plants (none neglected, but many repeated) will prove a better botanical journal of the expedition than all the notes which I might send you from here; nevertheless I have preserved some notes upon the particular places which are woody, if it is important to know them. There is one particular with which it is as well you should be acquainted—it is the geographical extent of the plants in the countries through which we have travelled; that is to say, the same species occupies a surface from 300 to 400 leagues. The prairies are well covered with plants, of the *Gramineæ* and *Cyperaceæ* in abundance, but of few species. Three distinct localities are to be met with in these prairies—the ordinary plains, marshes and streamlets, and dry rising grounds. Each of these three localities has its peculiar vegetation; but let each locality occur where it will, it presents the same plants throughout. The greater part of the plants at Fort Garry and Pembina are the same as those of Carlton; and it is my conviction that they extend close to the mountains. My collections of 1857, and a portion of those of 1858, you will receive this year; and I give you here the number of boxes which are addressed to you—two from Fort Ellice, containing the collections from Pembina, and some parcels of seeds. This collection is superb, and contains the plants gathered at the most southerly part of our voyage—viz. from the great prairie of the Tortue Mountain, and in the neighbourhood of the river at Souris, to Fort Ellice, where I remained some time, and was consequently able to make a careful collection of the *Compositæ*, which are in perfection from August 15th till the close of the season.

From Fort Ellice our route lay direct to Saskatchewan, the greater part of which is what we in Europe would call pasturage. It is indeed pasture-land, covered with buffaloes, and the grass being so constantly browsed does not attain any height. The country also seems very dry: there are some lakes, but few marshes. There are no forests; but, beside some streamlets, a few small copses of *Populus tremuloides*, which appear to have been spared from fires. The borders also of the Saskatchewan river at l'Elbow are wooded in some places with *P. balsamifera*, *grandidentata*, *tremuloides*, *Fraxinus*, and *Betula pumila*. In the marshy

localities, tufted Willows, interspersed with other shrubs, constitute a covert for deer, and specially for the bear, whose principal food, during the month of September, is the fruit of such shrubs as the *Shepherdia argentea*, which I have seen in large quantities in his stomach.

We arrived at Carlton on the 8th October, and there I finished putting in order my last collections, containing a quantity of seeds, besides the botanical specimens, and filling in all one case. There are 166 packets of different seeds, several shells, and some insects, which I beg you will keep until I return, to make the catalogue. Of this spring's collections, I send two cases—one containing the botanical packets, and the other some objects for your Economical Museum; and several diseases of plants, occasioned by the punctures of insects, for Dr. Hooker. In one of the boxes you will find some animals' skins and birds' eggs, which also I beg you will take care of till my return: each article is furnished with a ticket. As the news I looked for by the arrival of the Captain did not come, I shall be obliged to pass another winter at Edmonton, and I trust, by the following spring, to be enabled to visit those parts of the Rocky Mountains lying nearest this locality; and thus I shall have all the spring plants, which by arriving too late this season I run the chance of losing. It is well known that August is the most suitable month for traversing the mountains; and, besides, the *Compositæ* and seeds of many plants are not perfect till that season.

The total number of cases which you will receive in 1858 is—2 from Fort Ellice, and 3 from Carlton, making 5 in all.

I am anxious to reach the mountains as soon as possible. It is now two seasons since I saw any mountains resembling the Alpine chains of my native country.

Dr. Hooker, to whom I desire my respectful remembrances, will receive at the same time all the observations which I have taken since I left Carlton. I have a journal, in which I have notes upon the temperature of the trees, upon the weather, and on various circumstances; and, lastly, upon the vegetation, and specially upon a certain tree, which puts forth its leaves a month later, which I should like to know the cause of. I desire to do my utmost in rendering the voyage as useful to science as possible.

Accept, sir, every assurance of esteem from your humble servant,

E. BOURGEAU.

I have given special attention to the collection of *Salices* made

at Carlton: the species are not numerous, for which reason I have collected both male and female specimens of each plant, and have been careful to put corresponding numbers on each sex. There are a good many duplicates; therefore I trust you may have as many specimens as will enable you to study them satisfactorily. I regret not being able to send you the leaves of the *Salices*; they are not yet developed. During the third week of last month, the catkins of *P. balsamifera* have been frozen and have fallen off; several other plants, also in flower, have been frozen, and thus for a week I have been deprived of my excursions.

Observations referred to in the foregoing Letter, on the Temperature of the Earth and of Forest-trees, made at Fort Carlton, on the Saskatchewan.

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1857.	°	°	°	°	°
Nov. 1	39°0	41°0	....	....	37°5
2	39°0	41°5	....	....	27°0
3	39°0	41°5	....	....	36°0
4	39°0	40°5	....	....	....
5	39°0	40°0	....	....	....
6	39°0	40°0	....	....	26°0
7	38°0	39°7	....	....	25°0
8	37°5	39°0	....	....	15°0
9	37°0	39°0	....	....	21°5
10	37°0	39°0	....	....	15°0
11	37°0	39°0	....	....	25°0
12	36°5	38°5	....	....	26°0
13	36°0	38°0	....	....	25°0
14	36°0	38°0	....	....	31°0
15	36°0	38°0	....	....	22°0
16	35°5	37°5	....	....	31°7
17	35°0	37°0	....	....	29°0
18	35°0	37°0	....	....	22°0
19	35°0	37°0	....	....	2°0
20	34°7	36°7	....	....	34°0
21	34°5	36°5	....	....	+ 1°0
22	34°0	36°0	....	....	3°0
23	33°7	36°0	....	....	24°0
24	34°0	36°0	....	....	14°0
25	33°5	35°5	....	....	10°0
26	33°0	35°0	....	....	13°0
27	33°0	35°0	....	....	25°0
28	33°0	35°0	....	....	18°0
29	33°0	35°0	....	....	13°0
30	33°0	35°0	....	....	12°0
Dec. 1	33°0	35°0	....	....	17°0
2	32°5	35°0	17°0	....	13°0
3	32°0	34°0	9°0	....	- 1°0
4	32°0	34°0	7°0	....	10°5
5	32°0	34°0	11°0	....	17°0
6	32°0	34°0	12°0	....	15°0

TABLE (continued).

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1857.					
Dec. 7	32°0	34°0	— 1°0	....	— 14°6
8	31°5	34°0	+ 7°0	....	+ 4°0
9	31°0	34°0	5°0	....	+ 0°2
10	31°0	34°0	7°0	....	7°0
11	31°0	34°0	7°0	....	6°5
12	31°0	34°0	8°0	....	15°0
13	30°5	33°0	12°0	....	13°0
14	30°5	33°0	5°0	....	— 1°0
15	30°5	33°0	14°0	....	+ 29°0
16	30°5	33°0	15°2	....	+ 19°0
17	30°5	33°0	6°5	....	5°0
18	30°0	33°0	10°0	....	10°0
19	30°0	33°0	16°5	....	20°3
20	30°0	32°9	16°0	....	19°8
21	29°2	32°6	11°0	....	14°0
22	29°2	32°6	24°0	23°7	36°0
23	30°0	32°6	16°0	....	10°0
24	29°9	32°0	8°0	24°0	0°0
25	29°2	32°0	3°5	4°0	+ 11°0
26	29°0	32°0	8°2	9°0	26°5
27	29°0	32°0	6°0	14°0	5°9
28	28°5	32°0	5°0	14°0	10°0
29	28°5	32°0	12°4	8°0	15°0
30	28°0	32°0	10°0	15°0	15°0
31	28°0	32°0	5°0	11°0	— 7°0
1858.					
Jan. 1	28°0	32°0	....	5°5	+ 2°0
2	28°0	31°7	9°0	8°2	31°7
3	28°0	31°7	28°0	28°0	43°0
4	28°0	31°8	....	22°5	3°0
5	28°0	31°8	7°5	9°0	2°9
6	28°0	31°8	— 9°9	— 20°0	— 23°0
7	26°5	31°5	— 9°2	— 20°0	— 12°2
8	25°2	31°5	— 7°5	— 12°0	— 3°0
9	24°8	31°0	— 6°0	— 15°0	+ 10°0
10	24°6	31°0	....	+ 4°2	— 0°2
11	24°2	30°5	+ 2°5	....	+ 1°0
12	24°2	30°5	— 8°6	....	— 23°0
13	24°2	30°5	— 13°2	....	— 31°0
14	24°2	30°5	— 22°0	....	— 17°2
15	24°2	30°0	— 13°0	— 25°?	— 17°0
16	22°5	29°2	— 8°0	....	— 31°5
17	22°0	29°2	— 7°0	— 5°0	— 4°3
18	22°0	28°1	+ 12°2	+ 6°5	+ 20°5
19	23°0	28°1	....	+ 12°0	+ 15°9
20	23°0	28°0	+ 6°0	+ 8°0	+ 14°5
21	23°0	28°0	4°6	6°0	4°5
22	23°2	28°0	14°0	9°5	7°0
23	23°5	28°0	4°5	5°0	— 2°3
24	23°2	28°0	— 2°0	8°0	— 7°7
25	22°5	27°6	....	....	— 5°2
26	22°0	27°4	4°0	....	— 9°3
27	22°0	27°4	....	....	+ 0°8
28	21°8	27°0	....	....	— 13°0
29	21°5	26°2	2°0	— 10°0	+ 8°0
30	21°1	26°0	4°0	— 5°5	— 3°0
31	21°0	26°0	16°0	+ 10°0	+ 8°0

I have made some remarks on the temperature of trees in my journal.

Extremes of Atmospheric Temperature (Maximum and Minimum)
for every Twenty-four Hours.

Date.	Max.	Min.	Date.	Max.	Min.	Date.	Max.	Min.
1857.			1857.			1858.		
Nov. 12	0	30°2	Dec. 9	0°0	6°9	Jan. 4	- 1°0	28°0
13	9°0	27°2	10	-16°7	9°2	5	-14°1	7°0
14	12°8	33°0	11	4°7	16°0	6	13°0	25°0
15	18°0	35°0	12	5°0	33°0	7	-22°9	- 3°1
16	20°8	34°4	13	8°0	27°0	8	-13°0	- 0°2
17	11°2	31°0	14	- 1°5	12°0	9	-10°9	18°9
18	- 4°2	15°0	15	4°0	35°0	10	- 2°1	14°0
19	0°0	14°5	16	- 4°0	24°6	11	-15°0	18°0
20	10°2	41°1	17	-10°0	8°1	12	-34°0	-15°0
21	0°3	6°0	18	0°0	19°6	13	-40°0	-15°0
22	2°0	11°1	19	13°0	26°0	14	-14°0	26°2
23	11°9	34°0	20	12°1	21°0	15	-29°2	- 1°3
24	10°0	25°5	21	3°0	24°0	16	-11°4	- 1°3
25	9°1	28°0	22	24°2	41°0	17	- 6°2	15°3
26	10°0	30°0	23	6°0	23°8	18	5°2	26°1
27	22°8	26°2	24	-14°0	5°5	19	6°2	15°3
28	15°2	22°0	25	- 2°0	15°2	20	2°6	24°5
29	13°8	17°5	26	5°0	32°0	21	- 2°2	16°7
30	12°5	17°0	27	- 7°0	14°6	22	5°2	22°0
Dec. 1	14°9	18°9	28	- 6°9	14°9	23	-11°6	4°5
2	5°5	17°0	29	- 2°2	32°2	24	-14°5	22°0
3	- 4°9	8°0	30	8°0	18°5	25	- 8°9	13°3
4	- 5°5	17°2	31	- 7°0	19°8	26	-13°8	1°0
5	5°2	16°2	1858.			27	-12°3	5°0
6	1°5	23°0	Jan. 1	- 3°5	21°9	28	-14°7	5°0
7	-13°0	5°0	2	5°1	40°0	29		
8	2°0	8°5	3	29°0	45°0			

Continuation of the Observations on the Temperature of the Earth
and of Forest-trees, made at Carlton, on the Saskatchewan.

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1858.					
Feb. 1	0	26°0	....	15°0	2°0
2	21°8	26°0	- 7°0	-12°0	- 9°9
3	21°0	25°8	- 2°5	....	0°0
4	21°0	25°6	....	+ 7°0	+25°8
5	21°0	25°3	....	20°5	26°0
6	21°0	25°0	15°5	18°5	11°3
7	22°0	25°8	....	- 3°5	-14°3
8	21°0	25°8	- 4°2	-15°0	-11°2
9	20°7	25°2	-13°0	....	-25°0
10	19°4	25°0	-20°0	....	-22°0
11	18°2	24°5	-24°0	....	-23°7
12	17°5	24°0	-25°0	....	-27°3
13	15°0	24°0	....	-20°0	-29°3
14	14°2	23°1	The mercury shrunk into the bulb.		-36°0
15	13°5	21°5			-32°3
16	11°7	21°0			-15°3
17	11°5	20°4	- 9°5	-14°0	- 8°7
18	....	....	....	....	- 6°0
19	13°0	19°4	....	....	- 7°4

TABLE (continued).

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1858.					
Feb. 20	....	....	....	- 2°0	- 3°0
21	....	....	....	....	- 7°5
22	15°0	20°0	+ 4°0	- 5°0	- 2°0
23	....	....	....	+ 19°5	+ 37°0
24	17°1	20°6	....	+ 16°5	30°8
25	} Thermometers frozen.				35°3
26					30°3
27					6°6
28			+ 7°5	0°0	....
Mar. 1	19°8	23°0	7°0	....	1°0
2	18°8	23°0	....	6°3	1°0
3	18°0	22°6	12°5	....	17°2
4	18°8	22°0	....	11°0	22°0
5	19°0	22°2	21°5	....	26°2
6	19°8	22°2	....	26°0	33°2
7	20°7	22°2	28°6	29°5	32°5
8	23°0	23°5	31°0	....	31°5
9	24°0	24°5	30°0	....	16°0
10	....	....	....	24°2	....
11	24°8	24°8	28°0	28°0	28°2
12	25°0	25°2	....	26°0	38°7
13	25°8	25°8	29°5	....	30°0
14	26°0	26°0	28°0	....	31°0
15	26°5	26°5	32°2	....	38°5
16	26°8	26°8	32°0	32°0	....
17	27°0	27°0	32°0	....	28°0
18	27°7	27°2	31°0	26°3	31°0
19	27°8	27°8	31°0		43°3
20	28°0	28°0	30°8		32°8
21	28°0	28°0	26°0		21°2
22	28°0	28°0	27°2		31°9
23	28°0	28°3	31°2		35°7
24	28°5	28°6	31°8		42°0
25	28°8	28°9	31°8		37°8
26	28°8	29°0	32°0		32°2
27	29°0	29°0	32°0		38°2
28	29°0	29°0	32°0		44°7
29	29°4	29°0	32°5		28°1
30	29°5	29°0	33°0		40°3
31	29°8	29°6	35°0		39°0
April 1	29°8	29°6	32°0		....
2	29°8	29°7	32°5		32°8
3	29°8	29°7	32°0		26°9
4	29°8	29°7	32°0		28°6
5	30°0	29°8	31°7		28°3
6	30°0	29°8	33°0		40°0
7	30°0	30°0	33°8		39°4
8	30°0	30°0	32°5		36°1
9	30°0	30°0	33°5		40°0
10	30°0	30°0	34°5		42°9
11	30°0	30°0	33°0		49°8
12	30°2	30°0	34°5		48°4
13	30°2	30°0	34°0		....
14	30°2	30°0	....		26°2
15	30°2	30°0	32°0		16°0
16	30°3	30°2	32°0		25°4
17	30°3	30°2	....		28°3

The thermometer of the *Abies* was withdrawn on account of the thawing of the river, which it was necessary to cross to the other side.

TABLE (continued).

Date.	2 feet.	3 feet.	Populus.	Abies.	Atmosphere.
1858.					
April 18	30°5	30°5	32°0	....	43°0
19	30°6	30°5	35°0	....	42°0
20	30°7	30°6	36°0	....	44°0
21	30°7	30°6	....	....	43°0
22	30°8	30°7	34°5	....	36°0
23	30°8	30°7	37°5	....	32°0
24	30°8	30°7	....	....	42°0
25	30°9	30°8	34°5	....	45°0
26	31°0	30°8	....	....	44°0
27	31°0	30°8	....	....	54°0
28	31°0	30°8	47°8	....	41°0
29	31°2	30°9	54°0	....	53°9
30	31°2	30°9	....	....	....
May 1	31°3	30°9	59°0	....	68°5
2	31°6	30°8	....	....	48°0
3	32°0	31°0	59°0	....	61°0
4	32°2	31°0	In flower.	....	56°5
5	32°3	31°0	49°0	....	42°0
6	32°4	31°0	52°0	....	52°0
7	32°5	31°0	54°2	....	54°0
8	32°7	31°0	....	....	50°0
9	33°0	31°0	....	....	51°0
10	33°2	31°2	....	....	37°0
11	33°5	31°4	47°8	....	37°0
12	33°5	31°4	....	....	42°0
13	33°5	31°4	38°5	....	37°0
14	33°0	31°5	38°7	....	39°0
15	33°0	31°7	....	....	37°0
16	30°0	31°7	....	....	39°0
17	33°0	31°7	40°7	....	36°2
18	33°0	31°7	40°8	....	38°3
19	33°3	31°8	48°2	....	49°5
20	33°7	31°9	46°5	....	54°5
21	34°0	31°9	49°7	....	49°0
22	35°0	31°9	49°8	....	52°0
23	35°5	32°0	54°0	....	51°0
24	36°0	32°0	....	....	62°0
25	36°2	32°0	62°3	....	58°0
26	36°7	32°2	....	....	43°0
27	36°9	32°3	50°5	....	47°0
28	36°9	32°3	....	....	50°0
29	36°9	32°6	....	....	44°0
30	....	....	....	....	....
31	36°2	32°8	....	....	44°0
June 1	36°4	33°0	....	....	52°5
2	36°7	33°0	Leaves.	....	62°0
3	37°5	33°2	60°0	....	62°0
4	38°6	33°8	58°2	....	66°0
5	39°7	33°9	54°0	....	57°0
6	40°0	34°2	50°5	....	50°5
7	40°0	34°9	....	....	57°0

The earliest plants to flower were the following :—

1858. April 13.—*Abies Americana*, *Anemone patens*.

May 3.—*Phlox Hoodii*, *Populus tremuloides*.

May 5.—Two *Salices*, *Populus balsamifera*.

May 6.—Two other *Salices*, *Shepherdia argentea* and *Hippophaë*, *Lathyrus*?, *Equisetum*, *Tussilago*, *Negundo Fraxinus*, &c.

May 7.—*Viola* (two species), *Potentilla*, *Ranunculus*, *Androsace*, *Astragalus*.

May 8.—*Fragaria Canadensis*, two *Carices*, and *Poa*.

May 10.—*Salix*, *Lithospermum*, *Astragalus*.

Maximum and Minimum of every Twenty-four Hours (I began by the minimum) :—

Date.	Min.	Max.	Date.	Min.	Max.	Date.	Min.	Max.
1858.			1858.			1858.		
Feb. 1	-21°5	24°0	Mar. 15	31°0	39°0	Apr. 27	35°2	75°0
2	-30°4	-9°0	16	31°3	35°8	28	25°0	54°0
3	-25°2	0°0	17	25°8	31°5	29	27°2	64°5
4	9°7	32°0	18	15°5	33°0	30	31°0	65°0
5	14°0	32°2	19	12°0	41°2	May 1	42°2	69°0
6	-9°1	12°7	20	14°4	33°6	2	45°0	75°5
7	-23°0	-6°8	21	4°1	27°5	3	37°2	71°0
8	-24°7	3°0	22	23°7	40°0	4	40°1	73°2
9	-28°3	-10°0	23	31°0	40°0	5	30°0	52°7
10	-33°3	-4°7	24	25°5	41°5	6	33°5	60°0
11	-27°0	-7°8	25	21°6	39°8	7	38°8	61°7
12	-36°0	-19°7	26	22°5	35°4	8	31°0	63°3
13	-37°0	-24°0	27	21°0	41°2	9	33°0	60°8
14	-42°1	-23°6	28	15°8	49°5	10	33°0	59°8
15	-54°0	-24°2	29	32°4	45°0	11	14°5	43°8
16	-32°3	-9°7	30	30°2	43°8	12	24°2	45°5
17	-13°2	-1°6	31	29°0	45°9	13	20°0	32°0
18	-21°5	+1°2	Apr. 1	25°6	49°0	14	13°8	42°0
19	-24°4	3°8	2	25°3	34°6	15	27°0	58°7
20	-26°0	2°0	3	18°0	26°9	16	26°5	44°5
21	-31°0	8°0	4	16°0	37°0	17	28°6	48°0
22	-15°0	14°0	5	13°0	32°7	18	19°0	49°0
23	+3°6	39°2	6	22°0	47°0	19	30°5	61°3
24	7°2	32°8	7	22°0	48°8	20	41°2	70°3
25	18°4	44°6	8	22°0	37°2	21	34°0	72°2
26	19°0	39°0	9	18°6	48°7	22	39°0	67°2
27	-5°0	18°8	11	26°7	53°7	23	40°0	68°4
28	-16°5	10°0	12	27°0	67°8	24	50°3	70°0
Mar. 1	-18°0	2°4	13	24°5	50°0	25	35°3	69°0
2	-23°2	1°0	14	14°7	28°4	26	38°0	49°4
3	+3°3	17°2	15	9°0	48°0	27	45°0	54°7
4	8°0	20°7	16	9°0	48°0	28	38°9	54°0
5	3°0	24°0	17	19°8	42°0	29	33°7	48°8
6	15°5	39°1	18	34°2	61°0	30	31°9	51°0
7	12°6	35°8	19	29°0	63°0	31	27°6	56°2
8	23°7	38°8	20	23°6	52°5	June 2	44°0	72°0
9	22°9	46°7	21	18°0	48°3	3	49°5	70°0
10	13°7	30°5	22	20°0	44°2	4	46°8	77°8
11	15°6	37°7	23	20°2	45°5	5	44°0	63°3
12	21°2	39°2	24	26°5	55°0	6	31°9	56°0
13	11°7	43°8	25	28°0	52°7			
14	12°0	44°0	26	36°1	70°0			

Temperature of the Earth and Atmosphere at Edmonton at 9 A.M.

1858.	2 feet.	Atmosphere.		2 feet.	Atmosphere.
Nov. 9	37'5	44'0	Dec. 8	28'5	+ 10'0
10	37'5	34'0	10	26'0	— 7'5
11	37'5	31'5	12	23'0	— 16'0
14	36'8	32'0	13	21'5	— 10'5
18	35'5	20'0	18	21'0	— 10'5
21	35'0	19'0	20	18'5	— 9'0
24	34'5	17'0	24	17'0	— 18'0
27	33'7	25'0	28	16'5	— 15'2
30	33'0	0'0	30	15'7	+ 1'7
Dec. 2	32'0	— 14'0	1859.		
4	31'8	— 1'0	Jan. 2	13'5	— 1'7
6	30'0	— 23'5			

Letter from J. W. SULLIVAN, Esq., on the subject of the accompanying Observations. Addressed to J. D. HOOKER, Esq., M.D., F.R.S., F.L.S.

Fort Edmonton, Saskatchewan,
January 10th, 1859.

SIR,—I have taken the liberty of forwarding the accompanying sheet of Thermometrical Observations on the soil, which I made on the route of the expedition during the last season.

As M. Bourgeau's time was wholly taken up in collecting and drying his botanical specimens, I undertook the observations when opportunity permitted, and carried them on according to the directions you gave him.

I would have willingly made a more extensive series, but the plan of our travels in the Rocky Mountains, when the party was broken up and dispersed in different directions, put a stop to the work. However, I will endeavour during the ensuing season to obtain as large a number as possible. They will no doubt be of some value, especially if we are to extend our explorations to the shores of the Pacific Ocean.

I have the honour to be, sir,

Your obedient servant,

J. W. SULLIVAN,

Secretary to the Expedition.

Observations on the Temperature of the Soil, taken during the above Journey, by J. W. SULLIVAN, Esq., Secretary to the Expedition.

Lat.	Long.	Date.	Ther. in Air.	Ther. in Soil.	Nature of Soil.	Remarks.
52° 32' N.	109° 6' W.	1858. July 3	..	44° 9'	2½ ft. V.M.—F.S.	Superior soil to any in the neighbourhood.
52 35	109 22	4	..	54° 2'	1½ ft. V.M.—F.S.	Near poplar clump.
52 35	109 40	6	50°	49° 9'	S.	On a sand-hill near to a growth of small poplars.
52 36	110 23	7	56°	53° 9'	S.	
52 36	110 50	8	65°	50° 2'	S.	Valley of Battle Riv.
52 33	111 20	9	58° 7'	49° 1'	½ ft. V.M.—S.	Near poplar patches.
52 28	111 30	10	66° 6'	54° 2'	.. ..	Valley of Battle Riv.
52 28	111 30	11	62° 0'	54° 5'	.. ..	do.
52 27	112 0	13	..	53° 9'	1 ft. V.M.—S.	Fine pasture here.
52 24	112 19	15	55° 5'	51° 9'	do.	Poplars and fine pasture.
52 24	112 19	16	65° 0'	52° 2'	do.	Same place.
52 24	112 19	17	70° 0'	52° 2'	do.	do.
52 23	112 40	18	..	52° 1'	do.	Fair growth of poplars.
52 23	112 40	19	65°	51° 9'	do.	
52 19	113 3	20	84°	53° 4'	S.	Dead Man's Creek.
52 19	113 3	21	57°	53° 4'	.. ..	do.
52 18	113 10	22	58°	52° 0'	3 ft. V.M.	Valley Red Deer R.
52 13	113 40	23	47° 5'	52° 5'	do.	Nick Hills.
51 56	114 10	24	50° 5'	50° 5'	2 ft. V.M.—S.	Edge of the woods.
51 56	114 10	25	65° 7'	49° 0'	do.	do.
51 56	114 10	26	72°	50° 0'	do.	do.
51 56	114 10	27	69° 5'	50° 1'	do.	do.
51 56	114 10	28	65°	49° 5'	do.	do.
51 56	114 10	29	57°	49° 5'	do.	do.
51 36	114 0	30	63°	51° 9'	½ ft. V.M.—S.	In a creek valley.
51 26	114 0	31	46°	54° 4'	S.	do.
51 20	113 55	Aug. 1	75° 2'	54° 9'	S.	Prairie.
51 20	113 55	3	76°	55° 1'	S.	do.
51 9	115 6	9	60°	47° 2'	Shingle.	Bow River.

V.M. signifies Vegetable Mould
 —F.S. „ followed by Fine Sand.
 S. „ Sand.

Second Letter from M. E. BOURGEOU, Botanist to Capt. PAL-
LISER'S American Exploring Expedition. Addressed to Sir W.
J. HOOKER, F.R.S., F.L.S., and communicated by him.

[Read May 5th, 1859.]

Fort Edmonton, Saskatchewan,
October 9th, 1858.

SIR,—I have much pleasure in laying before you the results of my botanical labours during this second season.

I suppose that you have received my account of the preceding season, in which I gave you full details up to Fort Carlton. I shall now, therefore, confine my narrative to the period between that locality and the Rocky Mountains.

The expedition started on the 15th of June, crossing the prairie Saskatchewan between the two arms of the river of the same name. Some days afterwards I found several places rich in leguminous plants, and particularly some *Astragali*, which I had not found in the previous year. The numerous plants which I gathered led me to hope that I might find some fine things farther on. My only difficulty was from the rains, which fall annually in June and July. I recorded thirty-three days of more or less continuous rain. I have succeeded in preserving all my collections, without losing a single packet. I have not found as many different species as I had hoped to do. I have preserved many species already gathered the first season, on account of their forms, the dates, or their geographical distribution: probably half the collection is in duplicate.

On the 26th June we travelled over the open and treeless prairie, and on the 27th we encamped by a small forest of the two species of *Populus* (lat. $52^{\circ} 39'$ N., and long. $108^{\circ} 52'$ W.). On the 2nd July we reached more abundant forests, composed of the same trees, with thickets of rather large *Salix*, which provided us with excellent firewood.

The spaces between the forests consist of more or less marshy prairies, with large plants of different species, nearly all inhabitants of the forests, such as *Lathyrus*, *Vicia*, *Orobis*?, *Astragalus*, and *Carex*, in abundance.

The prairies are rich in food for animals, the grass averaging in height from 18 inches to 2 feet (lat. 52° N., long. $109^{\circ} 3'$ W.).

From the 3rd to the 7th July we crossed a wooded sandy slope. In many places the vegetation appeared to have suffered from the frosts and the hail. All the poplars looked as if they

had been trimmed. The ends of the branches are cut by the frost nearly every year, and the number of checks which they thus receive gives them a peculiar appearance. Near this place we crossed two wide spaces, where the hail had destroyed all the vegetation except the trees and the *Salix*.

It is worth describing to you the inconvenience of some seasons; for instance, the frosts which occurred this year, on the 15th of May and the last week of July, destroyed all the seeds of the trees; and the catkins of the *Populus* and *Salix* fell to the ground without ripening. The same thing occurred with the coniferous trees; and thus I have been unable this year to procure the seeds of any trees.

On the 10th of July we encamped on the shores of the river Battle, between the woods and rich prairies. The soil appears very fertile here; and I remarked some specimens of *Abies alba* and of *Pinus Banksiana* which had escaped the fire—the first observed since leaving Carlton. This river is insignificant in summer. Towards the boundary of the woods it is in some places sunk between high banks. Lat. $52^{\circ} 28' N.$, long. $111^{\circ} 17' W.$ from Greenwich.

From the 18th to the 20th of July we encamped on the prairies and amid thickets near the Lake de Bœuf, which contains an abundance of a rather large fish of excellent quality. At this place we were about fifty miles from the superb river De la Biche, which is of sufficient size for the navigation of the ordinary boats of the country. Its shores are wooded for about 100 miles, particularly with *Abies alba* and the two species of *Populus*, useful as timber. Vegetation also is vigorous, and the soil appears to be very fertile. The varieties of herbaceous plants are not very numerous, but the quality of the species forms a good forage for horses. Fires appear to have been less frequent in this latitude— $52^{\circ} 1' N.$

On the 24th, 25th, and 26th July, we were in sight of the magnificent chain of the Rocky Mountains. I here observed a change in the vegetation. The first plants which attracted my attention were the *Geum rivale*, *Polygonum viviparum*, two species of *Geranium*, &c. Although still 100 miles from the mountains, I am each day in hopes of finding new plants.

Near a large "coulée" named the "Coulée of Coloured Stones," the prairie is magnificent; the *Astragali* especially forming a great ornament to it. There are large patches of different colours, particularly red; a yellow and a white *Astragalus*; a red, a white,

and a violet *Geranium*; a *Hedysarum*; the three varieties of *Rhinnanthus*, &c.,—forming an *ensemble* most attractive to a botanist.

At last, on the 7th of August, we arrived at the foot of the Rocky Mountains, at the place where stood the ancient fort, in lat. $51^{\circ} 9' N.$, long. $115^{\circ} 4' W.$,—the shores of the River des Arcs being 4100 feet above the level of the sea. In ascending this river, it is found to flow from a large valley in the interior of the mountains, which I have named the Valley des Arcs, as far as the second lake, there being a first and a second Lake des Arcs. The high peaks of this valley bear the following names: Pic des Pigeons, Pic de la Grotte, Pic du Vent—the last being so named from the storms which begin upon its summit. I have explored this valley more than any, and especially the mountains on the northern side of the Pic du Vent, which I have found peculiarly rich in alpine plants. From the river to the limit of the snow, all the chain of peaks, as far as the eye can reach, are wooded, principally with three species of conifers, *Abies nigra*? and *alba*, and *Pinus*. The latter grows mostly on the southern slopes, and does not much exceed thirty feet high—the largest being about one mètre in circumference. The *Abies nigra*? is the largest and tallest of the forest-trees which I have observed in the Valley des Arcs; one which I measured was 3 mètres 23 centimètres in circumference. There are also other forest-trees in greater or less abundance, as *Populus balsamiflua*, *P. tremuloides*, *Betula papyracea*, and *B. pumila*. The shrubs are mostly the same as in the plains, except some *Salices* of the alpine region.

There are considerable obstacles to travelling in the mountains. The forests suffer almost every year from fires; the trees fall in all directions on the ground, and thus form innumerable barricades to the progress of horses, and even of men. To ascend to the summit of a mountain, a very hard day's work is needed to cross the forest region. This description holds good of all the localities which I have visited.

I am happy to inform you that I have made a good collection during this season. I hope that I have gathered the greater number of the plants inhabiting that portion of the mountains which I have visited, and which I have been able to explore in seventeen days. For weighty reasons it was not possible for me to remain there longer.

The month of August is the best period of the year, the plants being in perfect flower, and some few in fruit. I observed but few withered kinds.

List of some species gathered close to the perpetual snow :—

Silene acaulis.	Draba.
Silene — ?	Androsace.
Arnica.	Vaccinium.
Menziesia ?	Salix herbacea.
Pedicularis.	Poa alpina.
Gnaphalium.	Aspidium.
Erigeron.	Valeriana.
Artemisia.	Aquilegia.
Saussurea.	Dryas octopetala.
Luzula.	Epilobium.
Saxifraga.	&c. &c.

The nearest tree to the snow is *Abies alba*, which assumes the appearance of *Juniperus communis*, with which it grows ; that is to say, it trails along the ground. The alpine region is from 6500 to 8600 feet in elevation.

The vegetation is not rich in species ; the mountains are barren, with few streams and little humidity, and no pastures like those of the Alps. In the Rocky Mountains, streams are scarce on the southern slopes ; on the northern, water is more abundant, owing to the snow ; but they are only little torrents sunk deep in the rocks. This is the character of all the ravines which I have visited. The plants in the forests are for the most part common in the woods of the Saskatchewan plains. The number of species is about in the same proportion on the mountains as in the other parts of the country. They are few in number ; but each species is abundant ; and each mountain at the same elevation bears the same species, both on the north and on the south. All the collections made this season, and which are tolerably extensive and in a good state of preservation, are here at the Fort. Thanks to Captain Palliser, who has taken much interest in the success of my labours, and who has greatly assisted me in preserving the specimens from damp during the journey, I have about twenty-two packets of dried plants, and 110 of different sorts of seeds. The herbarium contains about 460 species, and about 60,000 specimens. I am now busy with the arrangement and packing of the collections, to be ready against the spring, the period fixed for my return to Europe.

I am, sir, &c. &c.,

E. BOURGEAU.

Letter from Mr. CHARLES BARTER, Natural History Collector to the Niger Expedition, addressed to Sir W. J. HOOKE, F.R.S., F.L.S., and communicated by him.

[Read March 3rd, 1859.]

Steamer Rainbow, at Sea,
Fernando Po to Bonny,
January 2nd, 1859.

SIR,—In a brief note by last mail I noticed the sending of some cases containing the greater part of my dry collections; by this I send five cases more, and one small cask: this will comprise all that I have collected, or is fit to send home at present. The contents of these cases I will not refer to here; I have given Dr. Baikie a list of all, which he will send to you. The only living plants that I have considered it prudent to send at this season are about 40 species of Orchids, a Cycad, and some bulbous plants; these, in a close box, with dry shavings, will, I trust, be out of the reach of frost. The remaining living plants require to be sent in glazed cases. I have divided these as nearly as possible, and filled three cases, with directions for them to be sent home in April; these will reach home about the 6th of May—perhaps rather too early, but I cannot depend on any one looking after them here. Duplicates of each species (about 80 in all) I have planted out in a small piece of fenced-off ground at the Consulate at Fernando Po; if this is kept clear of weeds, the plants will not suffer much for a year, when I hope to return and replace with them any of those failing which I send now. Some ferns and moist-growing plants I have placed about dripping rocks in a ravine east of the Cove at Clarence.

Nearly all my dried specimens, I regret to say, have suffered much from damp since lying at Fernando Po: this is especially the case with dried fruits; and many fine specimens, brought from so far, I was obliged to throw away; a fine collection of cereals was in this way entirely destroyed. Much of this would have been saved, if, when we had come, everything had been removed up to the town on higher ground, instead of putting all into an old palm-oil shed on the beach; but our men were sick, and help from the shore could scarcely be obtained. All goes on well that can be done with one's own hand; but nothing can be got out of the liberated African.

Some of the plants in the cases are interesting. I notice especially—
LINN. PROC.—BOTANY. C

cially the two kinds of Cola nuts, the produce of two distinct trees, one with four cotyledons, called "*Fatak*" by the Foulahs, the other with two cotyledons, called "*Gonja*" by the same people; the latter I have seen no living trees of; but it is said to come from the Ashantee country. The nut from which the present plant was raised I procured from a caravan at Rabba, on their return from the coast. The species with four cotyledons is the tree I mentioned formerly as existing at Fernando Po; I find it common in many parts of the lower Niger, abundant at Onitsha; it occurs also at Prince's Island, and is apparently a common tree along the coast. The flowers, like other *Sterculiaceæ* here, are variable in colour—cream-coloured, greenish-yellow, and pale-red. Both these species appear to be carried in about equal quantities into the interior; but the nut with two cotyledons is the most prized. "*Gonja*" in the Nupe country is worth about 100 cowries each nut, while "*Fatak*" averages about 80 only. The value of cowries at Rabba is 2500 for the dollar at 4s. 4d. Immense quantities of Cola nuts pass during the dry season from the coast to the interior. Caravans pass Rabba on the Kworra about half the year; of them about 1000 donkeys monthly are laden with Cola nuts: these are carried pannier-fashion—a basket on each side, each basket weighing on an average 50 lbs. Other caravan routes exist into this part of Africa; the principal one crosses the Kworra above Busa, direct for the Hausa country. Cola nuts are not much carried in the pod—this method is too cumbersome; but as it is necessary to keep them moist, and protected from the dry winds, the baskets are well protected with the leaves of a species of *Phrynium*, which keeps moist, and does not readily decay. Steamers running up this river might take some tons of Colas from the lower Niger, and dispose of them with advantage at Rabba.

The plant in case, called "*Bitter Cola*," is very different from ordinary Cola. I purchased dry nuts a long time since in the markets of the Borgu and Nupe countries, but could then ascertain nothing more than its coast origin. The seeds are much valued by the people for their medicinal properties, and command a higher price than Cola; the nuts are intensely bitter, but not astringent as common Cola. This tree I have not seen, but it grows at Onitsha and at Fernando Po; the fruit is about the size of a small peach, rose-coloured, and very pretty. The large *Artocarpean* noticed by Vogel in 1845 (the "*Oqua*" of the Eboe), I send many plants of, and have some 200 others planted out at Fernando Po. Its enormous fruit is very curious, but, I fear, as a fruit of little

value beyond its edible seeds; it is however a fine ornamental tree for planting in any of our tropical colonies. *Bassia Parkii* has puzzled me much: first I could not induce them to vegetate for months; now they continue dying off; but I trust some will reach home alive. The young plants of the "Opakala" will prove valuable, both as an economical plant, and as a fine tree. I have enclosed some of its large ligneous pods and edible seeds in one of the boxes. It grows in the lower Niger, Fernando Po, and Prince's Island; the negroes collect the seeds, boil them slightly, slice and dry them for future use. Some plants of the *yellow dye* (of Soudan) in the case are very small; but it has large roots, and a tendency to be herbaceous, so perhaps will not be dead, if invisible, when the case is opened.

We visited Prince's Island to purchase stock, and recruit the health of our sick people by a sea breeze. This island, unlike Fernando Po, has no very elevated land; it presents from the sea a number of peaks, an immense block of rocks (some conical, others flat-topped), with butting cliffs or perpendicular walls of sheer precipices more than 1000 feet high, these bare of any vegetation, white and dazzling in the tropical sun. We steamed into West Bay amidst torrents of rain, which, clearing up, showed a number of pretty cataracts descending in streams down the precipitous sides of the little mountains, in thin silver lines—when shooting the rock, spreading out as they came down in a horse-tail manner, till, falling far down, they were lost in a cloud of mist and vapour below. The rocks are mostly soft, having been changed by igneous action. The soil is rich, composed principally of decomposed trap; beds of conglomerate and pebbles lie about the base of the hills.

This island is celebrated for producing good coffee. Chocolate is also much grown, or rather has been extensively planted; numerous ravines, dark and gloomy, abounding in moisture, are well adapted for its cultivation. Traces of sugar plantations exist; but its culture seems now abandoned. Indeed everything evinces decay, and no system of management; coffee trees appear here and there, as if dropped from the clouds, struggling for life among trees and shrubs by which they are surrounded. Cacaos, more vigorous in growth, maintain their existence better, and soon take entirely for themselves the moist places in which they have been planted; the fruit of this was ripe at the time, and seemed the favourite food of monkeys, which must be very destructive to the crop. Ginger, arrowroot, yams, and all the fruits of the coast are grown

here in abundance for the supply of ships. Many fruit-trees have become wild; this is especially the case with *Anona muricata*, *Persea gratissima*, and *Carica Papaya*. Plantain, banana, mango, lime, guava, form no inconsiderable portion of the "bush" in the lower grounds; the pine-apple too, established everywhere, will defy extirpation. A Portuguese lady, long resident here, has attempted cultivation on a large scale. Her houses are large, and built in a style of magnificence unlooked-for out here: about them are avenues and vistas lined with graceful cocoa-nut trees in the background; *Jatropha multifida*, *Poinciana pulcherrima*, and a species of *Fourcroya*, planted at regular intervals, form the margin, and have a very pretty effect. I was unsuccessful in reaching the higher grounds, in two attempts, owing to the excessive rains and the density of the forest. Under the tall trees during the rains it is so dark and gloomy, that plants can hardly be seen; I therefore gathered but few. Much of my collecting was done in a boat, landing here and there whenever a footing could be obtained. Dr. Baikia and I visited many of the small islets which lie just detached in these bays, generally with a thorough drenching. These are mere rocks rising 20 or 30 feet above the water; some of them were covered almost exclusively with *Oleandra nodosa*, fully exposed to the sun and sea-breeze. The plants were 3 or 4 feet high, quite shrub-like in character, beautifully in fructification, and covered with lichens. On the steep sides of the larger rocks grew an abundance of a very large Orchid, resembling a *Vanda* in habit, but, like too many of the African Orchidaceæ, with small, yellow, insignificant flowers. *Melastomaceæ*, as usual, were plentiful; one species, 12 or 16 feet high, with magnificent red flowers, would be a fine ornamental plant in our stoves at home. I have sent, in the cases, plants of another species, of small growth, rose-coloured flowers, and scorpioid inflorescence. Species of *Mussaenda*, with their conspicuous white bracts, were common; also a shrub with spikes of purple flowers, like a *Veronica*: this had a singular pair of white leaves at the base of each spike, rendering it a very showy plant. Ferns were not wanting,—*Drymaria*, *Asplenium*, *Elaphoglossum*. *Polytrichum commune* I was much surprised to find occupying the moist hollows on the top of the rocks in dense tufts; with it, almost buried in the moss, grew *Trichomanes crispum*. In shady places a very pretty fern was growing, an *Asplenium* somewhat resembling *Darea cicutaria*, but of a still more elegant habit.

Whoever has an opportunity of visiting the quiet nooks in the

bays about these islands will be struck with the exquisite beauty of the waters and the various forms which can be seen beneath them. At 50 or 60 feet, the eye penetrates with ease: the bottom is rocky and very irregular; the boat at one moment glides over masses of coral-bound rock many feet below, but on which many beautiful sponges and corallines can be seen; the rest reveals nothing but a cavernous depth of blue water, unless a shoal of those beautiful fish of the tropics dart across. The rocks and everything that is exposed to the alternate action of the tides are covered with the small Mangrove Oyster; below it, seldom exposed, grows a pretty crimson Coral, with it a large *Flustra*. Gorgeous *Actiniæ*, with the common *Echinus* and Starfish of more northern climes, abound in all the little salt pools, on these rocks. The sponges are very large; but few are sufficiently soft to be fit for use. The waters are almost destitute of Algæ; I gathered but one species of *Fucaceæ*, and that not attached; a small plant of confervoid growth alone represents the family.

The vegetation of Prince's Island, from its proximity to Fernando Po, cannot, of course, be essentially different. At present I have seen so little of either island, that scarcely anything like a comparison can be ventured on. At Prince's Island I was at once struck with the abundance of *Begonias*; at Fernando Po only one species (and that with yellow flowers, and therefore a questionable *Begonia*) was seen. Some 10 or 12 species occur in Prince's Island: I gathered several; but being very juicy plants, I lost all but three in drying. I fancy three of those gathered to be identical with *B. nitida*, *B. ulmifolia*, and *B. Fischeri*. Most of the others were large-leaved succulent species, all having rose-coloured flowers; they grow on trees for the most part, a semiepiphytical life sustained in the black soil which collects on old trees of the forest. We found here an *Elæis*, which I fancy is distinct from *E. Guineensis*; the great size of some nuts which were brought alongside the ship for sale first drew my attention to it. These nuts were three times the size of *E. Guineensis*; the trees also present a different aspect, resembling more the cocoa-nut. The pinnae in *E. Guineensis* stand out irregularly, some pendulous, others erect; in this variety they are somewhat pendulous, but all regular and on one plane, as in the Cocoa-nut: the tree is not abundant, but grows scattered along the shore. The Baobab, not seen at Fernando Po, grows pretty common at Prince's Island, also the "Opakala" (a large Artocarpean), or "Oqua" of the Eboe; the latter I secured in flower for the first time. Little marshy ground

occurs; yet about the estuaries of small streams, *Avicennia rhizophora* and *Pandanus candelabrum* occur. The woods evince almost perpetual moisture; climbing *Aroideæ*, with immense orchids and ferns, occur; scarcely any of the orchids are interesting. Their flowers are insignificant, comprising such genera as *Angræcum*, *Bolbophyllum*, *Polystachya*. Of ferns, the most common are *Platynerium Stemaria* (very large), *Drymaria coronans*, *D. vulgaris*, *D. viridis*, *Asplenium crenulatum*, *A. like lucidum*, *Mertensia gigantea*, *Lygodium scandens*, *Gymnogramma Calomelanos*, *Angiopteris evecta*, *Acrostichum aureum*, *Lastrea mollis*, *L. invisæ*, *Teniopteris*. *Lastrea*, *Asplenium*, *Adiantum* *Diplazium*, *Gymnopteris*, *Trichomanes*, are largely represented. An *Acrostichum* resembling *Stenochlæna scandens* is very abundant, adhering to the trunks of trees like ivy. *Lycopodiums* are abundant, *L. dendroideum* especially, in loamy soil. *L. Phlegmaria*, epiphytical on trees, hanging down often a yard in length, and very beautiful.

I obtained a sprinkling of mosses, chiefly of *Hypnum*, some *Hepaticæ*, and a few curious *Fungi*.

This is a meagre account of the botany of this island; and my collection indicates little; the heavy rain, however, prevented me doing better. Much of the low land has been cultivated; and many introduced plants are now wild. *Canna indica*, *Caladium bicolor*, very beautiful in moist places, and a few European weeds exist—*Poa annua*, and *Plantago major*. An umbelliferous plant is very abundant, and must be indigenous; I believe it to be an *Eryngium*. Some very good cabbages are grown both at Prince's Island and Fernando Po without going to elevated ground; water-cresses are abundant in some of the brooks, but of course have been introduced.

Our repairs complete, we left Fernando Po on the 2nd of January. The weather in this island for the last three weeks has been almost free from rain, the days hot, with the usual haze of the dry season, called "smokes" by the traders. December to March are the best months for botanizing in this island. *Clerodendron splendens* and some fine scarlet *Combretaceæ* are very handsome at this season; most of the large forest-trees are also just flowering.

The mountains are seldom visible. Sometimes at dawn the peak of Clarence appears, but is enveloped in clouds soon after the sun rises; and an occasional glimpse of the stupendous Cameroon, towering far up in the firmament, is also obtained. I never rise at such times without anticipating the pleasure I shall have

in ascending these untrodden alpine forests and the bare regions beyond, where the monotonous vegetation of the hot plains of the interior must give way, to be replaced by those forms only found at elevations, and an African mountain botany which cannot fail to yield much that is new to Botanical Science.

We reached the Bonny this evening (4th) and lie at anchor inside the bar. This river has a much better mouth than the others, and is safer; but some wrecks are visible from where we lie. We shall ascend by the Brass river on the 8th, under much better auspices than formerly. Some difficulty is apprehended through the shallow water; for I think the Niger has never been entered before at this season. If we get aground in the delta, it may be a temptation to the natives; but as long as we can keep a healthy crew, we have not much to fear from the people.

Writing is difficult at sea in so small a ship, but off the bars of these rivers impossible. I hope to date my next, in one month, from Rabba.

I remain, Sir, your obedient Servant,

CHARLES BARTER.

P.S.—Consul Hutchinson and Lady arrived safely at Fernando Po; some roses which they received at Kew, I found alive, have had them planted, and all are growing.

Dr. Baikie, myself, and every European on board are in excellent health.

Second Letter from MR. CHARLES BARTER to SIR W. J. HOOKER,
F.R.S., F.L.S., &c., communicated by him.

[Read June 2nd, 1859.]

Steamer Rainbow,
Lagos, March 7th, 1859.

SIR,—By this mail I forward a bundle of dried plants, containing about 110 species, some specimens of woods*, the fruiting panicle of a *Calamus*, fruits preserved moist, and a few seeds. Some of the dried plants were collected on Lagos Island, but the greater part at "Eppah†," a town on the Crado Lake, about thirty miles east of Lagos.

We have spent more time here than could have been wished,

* The collections arrived safely, April 1859. Though a comparatively small collection, they are extremely interesting.—W. J. H.

† Dr. Baikie says, this should be spelt "Ekpe."

through the district about Lagos being disturbed by the ex-king Kosoko, and news that the Dahomeans were about to attack Abeocuta. This induced Dr. Baikie to visit Kosoko at his town of Eppah, distant about thirty miles from Lagos, on the Crado Lake. H.M.S. Brune, with Consul Campbell on board, went with us. This chief (Kosoko) received us with much courtesy, and expressed himself desirous of remaining on good terms with the English. His previous acts do not warrant the truth of these professions; but for the present no impediment exists to our moving inland. Dr. Baikie and myself will therefore leave about the 12th; Lieut. Glover and Dalton will come up afterwards.

The margin of the Crado Lake is nearly everywhere swampy, with but few tall trees, and scarcely any oil-palms; it may be said to be bounded with *Raphia vinifera*, which luxuriates in the fetid black mud, now (in the dry season) covered with fallen leaves, through which the foot sinks, at every step, above the ankle. Behind this the land rises; and about Eppah some rocks occur of soft iron conglomerate, with a rich loamy soil.

Lofty forest trees are first met with here, amongst which some tall *Clusiaceæ* are conspicuous; one with crimson flowers I recognize as being abundant in the lower Niger. It is a slender tree, 70 or 80 feet high, with branches only at the top, spreading out regular and drooping, so that in flower it resembles a gigantic crimson umbrella. All parts of this tree yield an abundance of yellow juice, resembling Gamboge when coagulated; some has been collected and sent to R. Bentley, Esq., to ascertain if it has any commercial value. Another large tree of this order I send dried fruits of, and some nuts; the latter are very oily, and a kind of butter is prepared from them: I suspect this to be *Pentadesma butyracea*, but do not know the plant.

A Rubiaceous tree (common on the Niger) grows about this lake. I cut down a tree, and obtained flowers, which grow in heads like *Sarcocephalus*; perhaps it is some *Nauclea*; the leaves are of great size in the young plant, with large foliaceous stipules. "Agidde," or country bread, is generally wrapped in the flexible leaves of this plant when it is exposed for sale in the markets. A noble *Composita* was seen here in open places; it sends up a slender stem from 10 to 20 feet high, unbranched, with large pubescent leaves on the top; its flowers, which are not ornamental, are produced when the plant has reached its height, after which it dies.

I send a large fruiting panicle of a species of *Calamus* (perhaps *C. secundiflorus*, for it is one of the commonest on the coast),

and imperfect specimens of a new species which has almost entire leaves, and a stem without spines. Many species of these climbing palms exist in the hot jungles which abound on the coast, but they nearly all grow to a great height, firmly attached by their hooked spines to lofty trees. Flowers or fruit in such situations it is almost impossible to obtain, unless many trees are felled for the purpose.

About the town of Eppah I gathered some fine crimson-fruited *Sterculiaceæ*. An *Apocynæa* with white fragrant flowers, *Acanthaceæ*, *Rubiaceæ*, and a few shrubby *Euphorbiaceæ* occupy the cleared places. *Phrynium Danielli* is very common in the deep woods; its singular-tasted fruit is now in the greatest profusion.

Orchids were very scarce; but on some old trees grew large masses of the *Rhizalis*, which I sent from Prince's Island.

The large Rubiaceous fruit (enclosed) is employed by the people in marking their faces and other parts of the person with permanent black lines. I believe an incision of the skin is necessary to effect this properly. It is used chiefly by those people who pride themselves on a skin a few shades lighter than the ordinary negro of the coast; the latter is too black for such an embellishment to be visible.

No. 3298 of 'Herbarium,' is a beautiful Anonaceous shrub growing at Eppah: the flowers (now turned black in drying) are very handsome; the long outer petals are spotted red, brown, and yellow, quite white at the base; the inner ones, almost hooded, have a singular appendage midway on the margin, which I first mistook for stamens, till a closer examination showed it to be Anonaceous. No fruit or seeds could be obtained; but, as I shall probably meet with it again in the Yoruba forests, I hope to see it yet in our stoves at home.

Aquatic plants can hardly be said to be numerous in Western Africa; the following species occur in the Crado Lake:—*Papyrus antiquorum*, 10 or 12 feet high, is very abundant about Palaver Island when the water is brackish, with *Typha angustifolia*, *Vallisneria spiralis*, *Pistia stratiotes*, *Jussiaea villosa*, *Azolla Nilotica*, *Nymphæa dentata*, *Ceratophyllum vulgare*, *Utricularia stellata*, *Ceratopteris thalictroides*, *Salvinia* sp., *Lemna* sp., and a species of *Hydrophyllaceæ* with small blue flowers; these plants occur in small bays or creeks where the water is undisturbed by the swell raised by the sea breezes. The bed of this lake is hard white clay; average depth of water 10 or 12 feet.

Before our interview with "Kosoko," I could only get on shore

quietly in a few places, penetrating twice about 3 miles inland. On this, the N.E. side of the lake, beyond the belt of swamp bordering it, the soil is fine rich loam, well-watered, and capable of growing any tropical produce. Some cleared ground occurs here and there; but very little of it is now under cultivation; for the growth of cotton it is well adapted. If the attention of the present occupiers could be turned to this article, several hundred square miles contiguous to water might produce cotton, which could be carried to Lagos by canoes merely across the lake. A considerable quantity of cotton is now coming down from Abeokuta (distant 70 miles from Lagos by river); the price paid there for cotton in the seed is one halfpenny per lb., three of which yield one pound pure when cleaned. Labour of cleaning, transit to Lagos, with shipment, raise it to 3*d.* per lb.; one penny more, freight to Liverpool, leaves still a profit; but a much larger supply is necessary before the leading merchants here will enter into the trade with the same advantage that now attends their dealings in palm oil.

Too much must not be expected of Central Africa as a cotton-producing country; the plant needs more moisture than it would obtain in much of the land in the interior, and water-carriage should never be far distant in a country where all loads are conveyed by canoe or on the heads of men and women. There is plenty of available land near the sea and by rivers; the great valley of the Niger would alone yield an enormous supply: it is here cotton must be looked for, and its growth encouraged; the great plains of the interior are almost as useless in this respect as Sahara itself.

I remain, Sir, your most obedient Servant,

CHARLES BARTER.

Note on the species of *Croton* described by Linnæus under the names of *Clutia Eluteria* and *Clutia Cascarilla*. By JOHN J. BENNETT, Esq., F.R.S., Sec. L.S.

[Read April 21st, 1859.]

DURING a late residence in the Bahama Islands, the attention of our indefatigable member, Dr. W. F. Daniell, was especially directed to the species of *Croton* growing in those islands; and I am enabled, by his kind communication of the specimens collected by him, to

clear up much of the obscurity in which the species furnishing the Cascarilla-barks of commerce have been involved. I willingly leave in his own able hands that portion of the subject which relates to the *Materia Medica* and the commercial history of the Barks in question, and shall limit myself, in the present brief notice, to the botanical history and discrimination of the species which have been confounded together under the specific names of *Eluteria* and *Cascarilla*.

The first account given by Linnæus of *C. Eluteria* occurs in 'Hortus Cliffortianus' (1737), pp. 486-7. Of the plant there carefully described, an authentic specimen exists in Cliffort's Herbarium in the British Museum, with a portion of the description attached in Linnæus's own hand, and marked with the only synonym quoted:—" *Cortex Ilatheria*. *Elutheria* Provid. foliocardato subtus argenteo. Sweet bark, s. cortex bene olens. Petiv. Collect. p. 4 n. 276." The synonym; the habitat, "crescit in Insula Providentia;" and the name *Elutheria*, derived from the adjacent island of Eleuthera, all bespeak its Bahamian origin. Of this very distinct species, a specimen brought from the Bahamas forms part of Catesby's collections in the British Museum; and there also exist, in the Banksian Herbarium, a similar specimen of Catesby's from Gronovius, together with specimens from the Herbarium of Philip Miller, from the "Bahama Islands, Long Island," collected by Peter Dean, Esq., in 1788; and from the "southern parts of North America," collected by André Michaux, the latter sent under the erroneous name of *Croton Cascarilla*. Linnæus himself never possessed a specimen; and having, apparently, entirely forgotten its characters, he referred to it in his 'Flora Zeylanica' (1748), No. 366 (with several other equally erroneous synonyms), the *Mahapatigaha* of Hermann's 'Museum Zeylanicum,' of which no specimen existed in Hermann's collections, and added the officinal synonym of *Cascarilla*. Of the additional synonyms, that quoted from Breynius, Plukenet, and Seba, unquestionably belongs to the plant subsequently named by Jacquin *Croton niveum*; and that of Plumier and Catesby, as we shall hereafter see, is the foundation of Linnæus's own *Clusia Cascarilla*. In his 'Materia Medica,' published in the following year, he ascribes the Cascarilla Bark to the *Eluteria* of his 'Flora Zeylanica,' with the single synonym of Catesby; while in the first edition of 'Species Plantarum,' published in 1753, he quotes, under *Clusia Eluteria*, his 'Flora Zeylanica' and 'Materia Medica,' *Eluteria* of 'Hortus Cliffortianus,' and the mistaken synonym of Plukenet and Seba. Of all

these, it is evident that the only true synonym is that of 'Hortus Cliffortianus,' from which the name of the species was derived.

Up to this time Linnæus had in his own herbarium no specimen referred to *Clutia Eluteria*; and there is no indication by which it can be positively determined whence and at what period the specimen which he subsequently designated by that name was obtained. It appears probable, however, that it was one of the Jamaica specimens received by him from Patrick Browne, and described in his 'Pugillus Plantarum Jamaicensium' (1759), inserted in the fifth volume of his 'Amœnitates Academicæ.' The description which he there gives (p. 411) of *Clutia Eluteria* is quite inapplicable to the original plant, and exactly agrees with this specimen. In the second edition of 'Species Plantarum,' he refers to this description, adds Patrick Browne's synonym, and retains that of 'Hortus Cliffortianus,' as well as the erroneous reference to Plukenet and Seba. It is only necessary to add, that in Swartz's 'Flora Indiæ Occidentalis' (p. 1183), Patrick Browne's plant is properly referred to the genus *Croton*, and is carefully described, under the name of *Croton Eluteria*, as synonymous with *Clutia Eluteria*, L., and that a figure of the true or Bahamian species, taken from one of Mr. Dean's specimens in the Banksian Herbarium, is given in Woodville's 'Medical Botany,' t. 223, together with a sketch of a miserable scrap of the Jamaica plant from a specimen communicated to the same Herbarium by Dr. Wright, who, in the eighth volume of the 'Medical Journal,' describes it as producing "the Cascarilla or Elutheria of the shops."

I now turn to the second species, *Clutia Cascarilla*, L. Linnæus had originally no knowledge of this species, except that which he derived from the figure of Catesby and the synonym of "*Ricinoides elæagni folio*," quoted by Catesby from Plumier; and both of these he referred, in his 'Flora Zeylanica,' to the confused heap there collected under the head of *Eluteria foliis cordato-lanceolatis*. The same confusion between the Bahamian and the Ceylonese species was continued in his 'Materia Medica'; but in the first edition of 'Species Plantarum' he distinguished the plant figured by Catesby under the name of *Clutia Cascarilla*,—mistaking, however, the habitat, which Catesby indicates as the Bahamas, and substituting Carolina in its stead. As he denotes by his usual symbol (†) that he had never seen this species, and quotes no other synonym than that of Catesby, there can be no question that the species is wholly founded on the figure and description of that

author, both of which are remarkably good representations of a plant of which Dr. Daniell has brought home excellent specimens, and which (as far as I am aware) has never before been forwarded to European herbaria. Catesby's description is as follows:—"The *Ilathera* Bark; *La Chachrille*. These shrubs grow plentifully on most of the Bahama Islands, seldom above ten feet high, and rarely so big as a man's leg, though it is probable that, before these islands were exhausted of so much of it, that it grew to a larger size: the leaves are long, narrow, and sharp-pointed, and of a very pale light-green colour; at the ends of the smaller branches grow spikes of small hexapetalous white flowers, with yellow apices, which are succeeded by tricapsular pale-green berries, of the size of peas, each berry containing three small black seeds, one in every capsule. The bark of this tree being burnt, yields a fine perfume; and, infused in either wine or water, gives a fine aromatic bitter."

As in the former case, it was not until after the publication of the species in the first edition of his 'Species Plantarum,' that Linnæus became possessed of a specimen totally different from the original plant, but which he nevertheless referred to it. The same concurrence of circumstances as in the former case leads me to believe that this also was received from Dr. Patrick Browne. It perfectly agrees with the description of *Clutia Cascarilla* given in the same Dissertation in the 'Amœnitates Academicæ,' vol. v. p. 411, with the synonym of Browne, and with the figure of Sloane's 'History of Jamaica,' there quoted, and is the "Wild Rosemary" of most of the West Indian Islands, subsequently described by Jacquin under the name of *Croton lineare*—a name, which has since been generally, but erroneously, considered as synonymous with the *Clutia Cascarilla* of Linnæus.

It only remains to formularize these details, with the addition of discriminative characters, premising that both the original species and those which have been substituted for them are true Crotons, in the comprehensive sense in which that genus is still maintained.

1. CROTON ELUTERIA, foliis petiolatis subcordato-lanceolatis obtuse acuminatis supra viridibus squamulis peltatis raris punctatis subtus dense argenteo-lepidotis lucidis, spicis simplicibus axillaribus terminalibusque monoicis.

Elutheria Providentiæ, folio cordato subtus argenteo. Sweet Bark, s. cortex bene olens. *Petiv. coll.* 4, n. 276.

Elutheria, *L. Hort. Cliff.* p. 486!

Clutia Eluteria, *L. Sp. Plant.* ed. 1. p. 1042 (*excl. synonym. omn. præter Hort. Cliff.*).

Clutia Eluteria s. *Cascarilla*, *Woodv. Med. Bot.* p. 633, t. 223. f. 2!

Hab. In Insulis Bahamensibus, *Catesby! Dean! Dr. W. F. Daniell!*

2. *CROTON CASCARILLA*, foliis petiolatis anguste lanceolatis utrinque attenuatis acutis margine planis v. subundulatis supra viridibus glabris subtus pallidis pilis stellatis intricatis dense vestitis, spicis simplicibus terminalibus monoicis.

Ricinoides elæagni folio, *Plum. Spec.* 20; *Icon.* p. 236, t. 240. f. 1; *Catesby Carol.* vol. ii. t. 46.

Clutia Cascarilla, *L. Sp. Pl.* ed. 1. p. 1042.

Hab. In Insulis Bahamensibus, *Catesby; "Providence," Dr. W. F. Daniell!*

3. *CROTON LINEARE*, foliis subsessilibus linearibus obtusis margine plus minus reflexis supra viridibus glabris subtus pallidis pilis stellatis intricatis densissime vestitis, spicis simplicibus axillaribus terminalibusque dioicis.

Ricino affinis odorifera fruticosa major, rosmarini folio, fructu tricocco albido, *Sloane, Hist. Jam.* i. p. 133, t. 86. f. 1!

Croton fruticosum; foliis longis, angustis, subtus incanis margine reflexis, *Browne, Jam.* p. 347.

Clutia Cascarilla, *L. Amæn. Acad.* v. p. 411; *L. Herb.*!

Croton lineare, *Jacq. Amer.* p. 256, t. 162. f. 4; *Pict.* p. 124, t. 263. f. 80.

Croton Cascarilla, *Woodv. Med. Bot.* p. 629, t. 222.

Hab. In Ins. Jamaica, *Sloane! Houstoun! Wright!*; in Insulis Bahamensibus, *Catesby! Dr. W. F. Daniell!*

4. *CROTON SLOANEI*, foliis petiolatis ovatis obtusis v. obtuse acuminatis perforatis squamulis peltatis supra raris infra numerosis adpersis, spicis compositis axillaribus terminalibusque monoicis.

Mali folio arbor artemisiæ odore et flore, *Sloane, Jam.* ii. p. 30, t. 174. f. 2!

Clutia Eluteria, *L. Amæn. Acad.* v. p. 411; *L. Herb.*!

Croton Eluteria, *Swartz, Fl. Ind. Occid.* p. 1183; *Wright, in Med. Journ.* viii. p. 3! *Woodv. Med. Bot.* p. 634, t. 223. f. 1 (*pess.*)! *Hayne, Arzneypgew.* xiv. t.

Hab. In Ins. Jamaica, *Sloane! Wright!*

These four species are so totally distinct, that, when once discriminated, they can never again be confounded. In addition to the three former, Dr. Daniell's collection from the Bahamas contains specimens of *Croton lucidum*, *L.*, and *Croton balsamiferum*, *Jacq.*

Notes on *Homalium*. By GEORGE BENTHAM, Esq., V.P.L.S.

[Read June 2nd, 1859.]

IN the revision of the 'Hong Kong Flora,' with which I have been lately occupied, I had occasion to investigate the validity of the genus *Blackwellia*, of which an elegant Chinese species was many years since introduced into our gardens, and has found its way into catalogues and botanical works under six different names. The result of this investigation has been the conviction that the genus must altogether be united with *Homalium*. I could not, however, come to this conclusion without a careful examination of all the species referred to both genera of which we had specimens; and as I also found several unpublished ones in the herbaria at Kew, I have been led to draw up a short synopsis of the whole group, which I now beg to lay before the Society.

The genus *Blackwellia* was originally established by Jussieu and Lamarck on two or three Mauritius trees which differed from the only two *Homalia* then known, both from South America, in having only one instead of three stamens opposite each petal (or inner segment of the perianth as it was then called). Ventenat afterwards added two or three eastern species having the same peculiarity; and De Candolle, in the 2nd vol. of the 'Prodromus,' maintained the two genera, with the same technical character as well as geographical distinction. Since then, several Asiatic species with two or more stamens to each petal have been described, and yet they have been published as *Blackwellias*. An exception, has been made in the case of the African *Homalium angustifolium*, which has the character of the American ones; and Sir James Smith, who always closely adhered to generic character, published it accordingly as a *Homalium*. Modern botanists, however, applying too literally the rule of "character non facit genus," appear in this instance to have practically adopted geographical origin as the sole basis of the limitation of the two genera. Some other characters are indeed indicated by Endlicher and others, such as the supposed larger calycine segments or capitate stigmas of the American ones; but none of them will bear the test of examination. And few, I believe, would now contest the generally admitted rule in systematic botany, that geographical origin without any character is not to be recognized as a generic distinction. It therefore becomes necessary to unite the Asiatic clustered-stamened species with the corresponding American *Homaliums*. As some of these, again, in other respects resemble the single-stamened species more than

they do each other, and as the whole series have a remarkable conformity in the general structure of their flower as well as in foliage and in habit, it appears more appropriate to consider them all as one genus, which can be artificially divided into two sections on the old character.

There is one point, however, in which the American species appear slightly to differ from the Asiatic and African ones: the fruit, at least in *H. densiflorum* and *H. pedicellatum*, becomes very hard, and in our specimens shows no disposition to open in valves, whilst it does so most readily in some of the Asiatic ones, splitting the styles so as to cause them to have been occasionally described as double their real number. But I have not seen the fruit quite ripe in any species: the ovary, shortly after flowering, appears to harden in the Asiatic *H. grandiflorum* as in the above-mentioned American ones; and in the original American *H. racemosum* and *H. Racoubea*, the fruit is said to open in short valves at the top, although I see no tendency to it in our specimens. This character cannot therefore be made available for generic distinction, being accompanied by no corresponding differences in habit or in other organs.

Among old genera not really differing from *Homalium*, *Racoubea* (Aubl.) has long been united with it, and *Astranthus* (Lour.) with *Blackwellia*; Miquel has also correctly joined with it the *Condyllocarpus* lately established by Blume. On the other hand, *Napimoga* (Aubl.), which does not appear to have been examined since his time, can scarcely be a congener, not having the characteristic glands: the analyses given, rude as they are, are not to be depended on for correctness, and afford no evidence of the plant belonging even to the same natural order.

In the distinction of the species, besides the artificial sectional character above mentioned, the inflorescence, either a close panicle with short divaricate branches, or long racemes, either solitary or few, forming a long loose panicle, as indicated by De Candolle, divides well the *Blackwellias* into two groups; and the species are mostly well characterized by the relative size and shape of the calycine segments and petals taken especially when slightly enlarged after the flowering is over. In some of the section *Blackwellia* they are all nearly of a size, linear or oblong, slightly narrowed at the base, ciliate at the edges, so as to give the young fruit precisely the shape of elegant little shuttlecocks; in *H. senarium*, *H. pedicellatum*, and others, they are all broader at the base, spreading or reflexed and radiate round the base of the

hardened conical free part of the fruit; in others, again, all have a tendency to close over the young fruit. In *H. grandiflorum* and *parvifolium* the calycine segments are much enlarged, oblong, narrowed at the base, thin and spreading horizontally, whilst the shorter and broader tomentose petals close over the fruit: in the *H. bracteatum* the same arrangement apparently takes place; but it is the petals or inner row that are enlarged and spreading, whilst the calycine segments, or outer row, remain broad and short, and close over the fruit.

HOMALIUM, Jacq.

Homalium et Blackwellia, Juss. Gen. p. 343; DC. Prod. vol. ii. p. 54; et Auct. recent.—*Cordylanthus*, Blume, Mus. Bot. vol. ii. p. 27.

Calycis tubus turbinatus v. oblongus ovarii basi adnatus; limbus pluripartitus segmentis (4–12) petalisque totidem cum iis alternantibus persistentibus post anthesin sæpius accretis. Glandula pulvinata intus ad basin cujusve calycis segmenti. Stamina ad basin petalorum inserta iis opposita, tot quot petala, vel ad quodque petalum 2–7 approximata v. fasciculata. Ovarium uniloculare, basi adnatum et vacuum, superne liberum conicum, stylis 3–5 liberis v. basi connatis coronatum; placentæ parietales versus apicem cavitatis tot quot styli et cum iis alternantes; ovula in quaque placenta 2–6 (sæpius 4) pendula. Fructus paullo accretus, siccus, medio calycis segmentis petalisque persistentibus et sæpius accretis cinctus, apice valvulis stylos findentibus et medio placentiferis breviter dehiscens (v. induratus et indehiscens?). Semina pauca parva pendula oblonga. Albumen haud copiosum. Embryo rectus, radícula brevi supera, cotyledonibus oblongis tenuiter foliaceis.—Arbores fruticesve regionum calidiorum utriusque orbis. Stipulæ parvæ, sæpius caducissimæ. Folia alterna integerrima v. sæpius obtuse dentata pennivenia. Racemi axillares simplices v. in paniculas terminales dispositi, v. paniculæ divaricate ramosæ. Flores ad axillam bractæ parvæ sæpe inconspicuæ sessiles v. breviter pedicellati, solitarii v. fasciculati, singulive sæpius sub calyce minute bi-bracteolati. Perianthium sæpissime tomentosum v. pubescenti-ciliatum. Ovarium extus tomentosum v. villosum, intus plus minus villosum.

Sectio I. BLACKWELLIA. Stamina tot quot petala singulatim iis opposita. Species omnes Gerontogæ.

* *Paniculata*. Paniculis breviter divaricato-ramosis.

1. H. NEPALENSE. Foliis (amplis) petiolatis ovatis crenato-dentatis submembranaceis glabris, paniculis divaricato-ramosis, floribus breviter pedicellatis 6-7-meris, calycis segmentis linearibus petala oblonga tomentoso-ciliata subæquantibus.—*Blackwellia Nepalensis*, DC. Prod. vol. ii. p. 54; Wall. Pl. As. Rar. vol. ii. p. 179.—Folia 3-5-pollicaria. Flores parvi, fere *H. paniculati*. Styli 3-4.

Hab. Nepal, Wallich.

2. H. PANICULATUM. Foliis (amplis) petiolatis ovatis orbiculatis suboblongisve integerrimis subdentatisque coriaceis glabris nitidis, paniculis ramosis, floribus breviter pedicellatis 8-12-meris, calycis segmentis petalisque linearibus subæqualibus plumoso-hispidis.—*Blackwellia paniculata*, Lam., DC. Prod. vol. ii. p. 54. *B. integrifolia*, Lam. Ill. t. 412. f. 2; DC. l. c.; et (forma angustifolia) *B. glauca*, Vent. Choix, t. 55; DC. l. c.—Folia bipollicaria et majora, novella tenuia, adulta crasso-coriacea. Flores parvi eleganter plumosi. Styli 5, v. rarius 6?

Hab. Mauritius, Bojer and others.

3. H. RUFESCENS. Foliis (parvis) petiolatis obovatis oblongisve submembranaceis nitidis glabris basi angustatis, racemis brevibus paniculatis, floribus pedicellatis 7-8-meris, calycis segmentis linearibus quam petala oblongo-linearia ciliata paullo brevioribus.—*Pythagorea rufescens*, E. Mey. Pl. Dr. exs. *Blackwellia rufescens*, Arn. in Hook. Journ. Bot. vol. iii. p. 149.—Flores parvi fere *H. paniculati*. Folia multo minora et tenuiora, vulgo $1\frac{1}{2}$ -2 poll. longa, $\frac{3}{4}$ poll. lata, integerrima, v. sinuato-dentata. Styli 4-5.

Hab. Port Natal, Drège, Gueinzus.

** *Racemosa*. Racemis elongatis ad axillas solitariis v. ad apices ramulorum paucis subfasciculatis v. laxè subpaniculatis.

4. H. AXILLARE. Foliis subsessilibus ovalibus oblongisve subcrenatis glabris, racemis elongatis, floribus (subsessilibus? 7-meris?), calycis segmentis petalisque linearibus ciliatis subæqualibus.—*Blackwellia axillaris*, Lam. Dict. vol. i. p. 420; et Ill. t. 412. f. 1. An etiam *B. gracilis*, Blum. Mus. Bot. vol. ii. p. 26, floribus pedicellatis?

Hab. Madagascar. I have seen no specimens; nor had Blume, it would appear, seen any authentic ones, of the original plant; and I strongly suspect that the discrepancies which he found between Lamarck's figure and the specimen he received from Paris, and which induced him to publish the latter as new, are owing to inaccuracies of the artist.

5. H. TOMENTOSUM. Foliis subsessilibus late obovatis repando-subcrenatis supra glabris subtus puberulis tomentosisve, racemis elongatis tomentoso-villosulis, floribus parvis glomeratis subsessilibus 5-6-meris, calycis tubo brevi, segmentis petala oblongo-linearia subæquantibus. *Blackwellia tomentosa*, Vent. Choix, t. 57; DC. Prod. vol. ii. p. 55.

B. spiralis, Wall. in As. Res. ; DC. *l. c.* Folia 4-6-pollicaria. Flores in hac et sequente, minimi, numerosi. Styli 3-4.

Hab. Java, also Pegu, *Wallich*. Catal. no. 4897 A. in part.

6. *H. LONGIFOLIUM*, sp. n. Foliis petiolatis oblongis v. anguste obovato-oblongis subintegerrimis glabris, racemis elongatis tomentosis, floribus parvis glomeratis pedicellatis 6-8-meris, calycis tubo brevi segmentis linearibus quam petala lineari-cuneata vix brevioribus.—Folia 5-6 poll. longa, raro 2 poll. lata, subcoriacea, nitidula.

Hab. Penang, *Phillips*. Distributed also by Wallich with the last, under the name of *B. spiralis*, from the Calcutta Garden, Catal. no. 4897 A.

7. *H. ZEYLANICUM*. Foliis petiolatis ovali-ellipticis ovatisve acuminatis subdentatis demum coriaceis nitidis glabris, racemis elongatis tomentellis, floribus parvis glomeratis pedicellatis 4-6-meris, calycis tubo oblongo-turbinato, segmentis oblongis quam petala obovati-oblonga ciliata brevioribus.—*Blackwellia zeylanica*, Gardn. in Calc. Journ. Nat. Hist. vol. vii. p. 452. *B. tetrandra*, Wight, Ic. vol. v. t. 1851.—Folia pleraque 3-4-pollicaria, juniora membranacea. Styli 3-4.

Hab. East Indian Peninsula, Pulney Mountains, *Wight*; Concan, *Stocks*; Ceylon, *Walker*, *Gardner*, *Thwaites*.

8. *H. AFRICANUM*. Foliis breviter petiolatis ovalibus oblongisve dentatis glabris, racemis elongatis, floribus sessilibus glomeratis 5-7-meris, calycis tubo turbinato, segmentis acutis quam petala oblongo-cuneata multo minoribus.—*Blackwellia africana*, Hook. fil. Fl. Nigr. p. 361.—Folia 4-5-pollicaria. Styli 4-5.

Hab. Sierra Leone, *Don*; Lagos, *Barter*.

9. *H. FAGIFOLIUM*. Foliis breviter petiolatis ovalibus obovatisve dentatis membranaceis pubescentibus v. demum glabratiss, racemis elongatis ramulisque pubescentibus, floribus pedicellatis sparsis 6-8-meris, calycis tubo anguste turbinato, segmentis lineari-cuneatis quam petala ciliata paullo minoribus.—*Blackwellia fagifolia*, Lindl. in Trans. Soc. Hort. Lond. vol. vi. p. 269. *B. padiflora*, Lindl. Bot. Reg. t. 1308. *B. Loureiri*, Benth. in Lond. Journ. Bot. vol. i. p. 482. *Astranthus cochinchinensis*, Hook. Bot. Mag. t. 2659 (foliis solito angustioribus), an Lour.?—Folia subtripollicaria. Styli vulgo 4.

Hab. South China. By a misprint, this species is called *B. pubiflora*, Lindl., by Walpers; and it is probably the same one also that Steudel, by some such mistake, has indicated under the names of *B. chinensis* and *B. grandiflora*.

Sectio II. *RACOUBEA*. Stamina ad quodque petalum 2-7 approximata v. fasciculata. Racemi simplices v. laxe subramosi, sæpius elongati.

* *Americana*.

10. *H. RACOUBEA* (*Sw.*, DC. *Prod.* vol. ii. p. 53). Foliis ovalibus oblongisve subacuminatis crenato-dentatis glabris nitidis, floribus subsessili-

bus 6-7-meris, calycis segmentis quam petala ovata minoribus, staminibus ad petala ternis, stylis 3 usque ad ovarium villosum distinctis.—*H. surinamense*, Steud. in Flora, 1843, p. 756.—Folia 3-4-pollicaria rarius longiora. Bracteæ et bracteolæ parvæ, sed evidentiores et diutius persistentes quam in 2 sequentibus. Perianthium post anthesin annulatum patens.

Hab. North Brazil and Guiana; on the Solimoes, *Spruce*; Surinam, *Hostmann*, no. 6 & 1053; British Guiana, *Rob. Schomburgk*, 1st Coll. no. 225, 2nd Coll. no. 883; *Rich. Schomburgk*, no. 1463.

11. *H. RACEMOSUM* (*Jacq., DC. Prod.* vol. ii. p. 53). Foliis ovalibus oblongisve acuminatis crenato-dentatis glabris nitidis, floribus distincte pedicellatis 6-7-meris, calycis segmentis quam petala ovata paullo minoribus, staminibus ad petala ternis, stylis 3 usque ad ovarium villosum distinctis.—*H. Racoubea* valde affinis et vix nisi pedicellis differt. Folia sæpius paullo minora.

Hab. West Indies: Jamaica, *Purdie*, *Macfadyen*, etc.; Cuba, *Linden*, no. 2108; Guadalupe, Dominica, Trinidad, etc.

12. *H. DENSIFLORUM* (*Spruce, Pl. Bras. exs.*). Foliis ovali-oblongis acuminatis crenato-dentatis subcoriaceis glabris nitidulis, floribus sessilibus 5-meris rarius 6-meris, calycis segmentis quam petala ovata pluries minoribus, staminibus ad petala ternis, stylis 3 basi in columnam glabram coalitis.—Folia 4-5-pollicaria. Flores quam in *H. Racoubea* paullo majores. Ovarii pars libera tubo striato æquilonga villosa, in stylum glabrum breviter trifidum abiens. Fructus ut in 2 sequentibus induratus (indehiscens?) medio perianthio patente annulatus.

Hab. Santarem, *Spruce*.

13. *H. PEDICELLATUM* (*Spruce, Pl. Bras. exs.*). Foliis oblongis acuminatis crenato-dentatis supra nitidis glabris subtus ad costam hirtellis, floribus pedicellatis 6-7-meris tomentellis, calycis segmentis quam petala ovata multo minoribus, staminibus ad petala subquinis, stylis 3 supra ovarium in columnam brevem coalitis.—Differt ab *H. racemoso* uti *H. densiflorum* ab *H. Racoubea* floribus majoribus, stylis basi coalitis et fructu indurato; et ab omnibus præcedentibus staminibus ut in sequente sæpius quinis (rarissime quaternis).

Hab. North Brazil and Venezuela, on the upper Rio Negro abundantly, *Spruce*, nos. 1489 and 3722.

14. *H. SENARIUM* (*DC. Prod.* vol. ii. p. 54). Foliis breviter petiolatis ovali-oblongis sinuato-dentatis glabris, floribus subsessilibus 6-8-meris dense tomentosis, calycis segmentis oblongis quam petala angustioribus, staminibus ad petala 5-6, stylis 3-4 usque ad ovarium distinctis.

Hab. Mexico, *Jurgensen* (without any no. in Herb. Hook.).

** *Gerontogea*.

15. *H. VITIENSE*, sp. n. Foliis ovatis vix coriaceis glabris, floribus subsessilibus 8-10-meris, calycis tubo oblongo-turbinato, segmentis lineari-

ribus quam petala lineari-cuneata vix minoribus, staminibus ad petala 2-3-nis.—*H. fœtido* certe affine, sed distinctum videtur. Folia 2-3-pollicaria. Flores sessiliores, tubo longiore, calycis segmentis petalisque post anthesin longioribus et minus inæqualibus. Styli sæpius 4.

Hab. Naviti-Leon, one of the Feejee Islands, *Milne*. This species has quite the shuttle-cock flowers of several of the 1st Section.

16. *H. FÆTIDUM*. Foliis (amplis) ovali-ellipticis suboblongisve crenato-dentatis submembranaceis glabris v. ad costam puberulis, floribus glomeratis brevissime pedicellatis 6-10-meris, calycis tubo breviter turbinato, segmentis anguste linearibus quam petala oblongo-cuneata ciliata paullo brevioribus, staminibus ad petala subgeminis.—*Blackwellia fœtida*, Wall., Deless. Ic. vol. iii. p. 32, t. 53.—Folia 5-8-pollicaria. Racemi elongati tenuiter tomentelli. Flores parvi. Styli 3-4.

Hab. Indian Archipelago, Mergui, *Griffith*; Amboyna, *Roxburgh*; Moluccas, *Wallich*; Celebes, *Miq.* *Fl. Ned. Ind.*

17. *H. ANGUSTIFOLIUM* (*Smith, DC. Prod.* vol. ii. p. 54). Foliis subsessilibus anguste oblongis subdentatis glabris, racemis elongatis, floribus sessilibus 5-7-meris, calycis tubo turbinato, segmentis quam petala cuneato-oblonga multo minoribus, staminibus ad petala ternis.—Folia 2-5-pollicaria.

Hab. Sierra Leone, *Herb. Smith*.

18. *H. PARVIFOLIUM* (*Hook. fil.*). Foliis petiolatis parvis ovali-oblongis acuminatis vix dentatis glabris nitidis, floribus subsessilibus confertis 6-7-meris, calycis tubo breviter turbinato, segmentis post anthesin patentibus oblongis quam petala ovata inflexa sublongioribus, staminibus ad petala subquinis.—Folia 2-pollicaria. Racemus in specimine brevis densiflorus cano-tomentellus. Flores fere sequentis nisi minores. Styli brevissimi.

Hab. Borneo, *Lobb*.

19. *H. GRANDIFLORUM*, sp. n. Foliis breviter petiolatis amplis oblongis subintegerrimis coriaceis nitidis glabris, floribus pedicellatis 6-7-meris, calycis tubo breviter turbinato, segmentis post anthesin accretis oblongis patentibus quam petala ovata inflexa longioribus, staminibus ad petala sub-7-nis.—Folia pallida, rigida, 5-6-pollicaria. Racemi elongati cano-tomentosi. Flores sub anthesi circa 5 lin. diametro, petalis segmentisque calycinis patentibus parum inæqualibus. Post anthesin calycis segmenta usque ad 5 lin. longa glabriora tenuiora et stellato-patentia; petala paullo accreta supra ovarium arete inflexa. Styli vulgo 5, breves.

Hab. Malacca, *Griffith*.

20. *H. BRACTEATUM*, sp. n. Foliis breviter petiolatis amplis ovatis oblongisve dentatis coriaceis nitidis glabris, floribus sessilibus 4-5-meris, calycis tubo breviter turbinato, segmentis post anthesin

ovatis inflexis quam petala obovato-oblonga accreta patentia dimidio brevioribus, staminibus ad petala subternis.—Folia 6–8-pollicaria. Racemi elongati cano-tomentosi. Bractæ ovatæ concavæ quam in omnibus speciebus majores et diutius persistentes. Flores primo intuitu iis *H. grandiflora* similes, sed paullo minores et petala nec calycis segmenta stellato-potentia, dum hæc uti petala *H. grandiflora* supra ovarium inter petala arcte inflexa sunt.—Styli 4–5.

Hab. Philippine Islands, *Cuming*, no. 1109.

21. *H. CARYOPHYLLACEUM*. Foliis subsessilibus ovalibus obovatisve subcrenatis coriaceis glabris, floribus subsessilibus 5–6-meris, calycis tubo oblongo-turbinato, segmentis acutis quam petala ovali-oblonga vix brevioribus, staminibus ad petala ternis.—*Blackwellia caryophyllacea*, Zoll. et Mor. Verz. p. 33.—Folia per anthesin pauca supersunt, novella nondum evoluta ex Miq. 3-pollicaria. Racemi breves confertiflori. Flores 2 lin. longi. Ovarii pars libera tubo multo brevior. Styli 3–4.

Hab. Java, *Zollinger*, no. 958.

22. *H. CORDYLANTHUS*. Foliis breviter petiolatis ellipticis v. oblongis superne dentatis coriaceis glabris, floribus subsessilibus 3–6-meris, calycis tubo elongato, segmentis acutis quam petala ovali-oblonga paullo brevioribus, staminibus ad petala 3–4.—*Cordylanthus frutescens*, Blume, Mus. Bot. vol. ii. p. 28. t. 3. *Blackwellia longiflora*, Miq. Fl. Ned. Ind. vol. i. p. 715.

Hab. Java, *Blume*. I have not seen this plant. From *Blume's* description, it scarcely differs from the *H. caryophyllaceum* except in the still longer tube of the calyx.

Species dubiæ v. excludendæ.

ASTRANTHUS COCHINCHINENSIS, Lour. Fl. Cochinch. p. 225 (*Blackwellia cochinchinensis*, Bl. Mus. Bot. vol. ii. p. 27), is probably not distinct from *H. fagifolium*.

BLACKWELLIA MOLUCCANA, Bl. Mus. Bot. vol. ii. p. 27, founded upon the figure and description in *Rumphius*, Amb. vol. iii. p. 25. t. 11, appears to me scarcely to belong even to the order.

PYTHAGOREA COCHINCHINENSIS, Lour. Fl. Cochinch. p. 244, has been supposed to belong to *Blackwellia*, but nothing certain can be made out of his description. The “germen medium inter calycem et corollam” and “Capsula 4-locularis polysperma” are quite discordant with any *Homalineæ*.

BLACKWELLIA CERASIFOLIA, Vent., DC. Prod. vol. ii. p. 54, has an entirely free ovary, with the placentas extending to the base of the cavity. It cannot therefore remain in *Homalium*. It is probably the Madagascar genus with a free ovary, alluded to by *Brown*.

On East Indian *Salices*. By Dr. N. J. ANDERSSON, Professor of Botany in the University of Stockholm. Communicated by Dr. J. D. HOOKER, F.R.S., F.L.S.

[Read June 16, 1859.]

IN the Transactions of the Royal Swedish Academy of Sciences (Kongl. Vet. Akademiens Handlingar), 1850, pp. 465–502, I have already given a Synopsis of the Willows then known from the East Indies. Before that time, Roxburgh ('Plants of the Coast of Coromandel,' 1795) had described and figured *S. tetrasperma*; Don ('Prodromus Floræ Nepalensis,' Lond. 1825), *S. disperma*, *S. cuspidata*, and *S. japonica*; Fries (Nov. Fl. Suec. Mont. i., 1832) *S. nobilis* and *S. lenta*; and Wallich ('A Numerical List of Dried Specimens of Plants,' &c.) enumerated *S. Lindleyana*, *S. obovata*, *S. elegans*, *S. grisea*, *S. Kamanensis*, *S. eriostachya*, *S. pyrina*, *S. glabrescens*, *S. urophylla*, *S. calophylla*, *S. densa*, and *S. babylonica*.

During a tour to the Continent and England, in the year 1850, I had opportunity to examine almost all these species: at Berlin I determined the few forms brought from the Himalaya by W. Hofmeister in the expedition of Prince Waldemar of Prussia; in Paris I saw the collections of Jacquemont and Perrottet; and in London Mr. Kippist gave me a liberal access to the East Indian herbarium of the Linnean Society. Upon those materials was that Synopsis founded. I there gave diagnoses and descriptions of twenty-five species, to which were added a few "incertæ" and "dubiæ."

Now, having been so fortunate as to make use of the extremely rich collections formed in that vast land, and in the higher regions of the Himalaya mountains by Dr. J. D. Hooker and Dr. T. Thomson, of which the *Salices* were handed over to me by the generosity of Sir William Hooker and Dr. Hooker, I not only have had occasion to review the previously published determinations, but also to describe a very considerable number of new forms.

The species proposed in this paper are as follow:—

I. AMERINA.

* *Polyandræ*.

1. *S. tetrasperma*, Roxb.
S. pyrina, Wall.
S. urophylla, Lindl.

S. suaveolens, Ands.
S. ichnostachya, Lindl.
S. nobilis, Fr.

2. *S. calostachya*, Ands.
3. *S. apiculata*, Ands.
4. *S. glaucophylla*, Ands.

** *Fragiles, diandræ.*

5. *S. dealbata*, Ands.
6. *S. sericocarpa*, Ands.
7. *S. babylonica*, L.

II. HELICES.

8. *S. pycnostachya*, Ands.
9. *S. oxycarpa*, Ands.
10. *S. eriostachya*, Wall.

III. VETRICES.

* *Amentis* ♀ *sessilibus nudis.*

11. *S. daphnoides*, L., indica.
12. *S. insignis*, Ands.
13. *S. viminalis*, L.
14. *S. Smithiana*, Willd.
15. *S. populifolia*, Ands.

** *Amentis pedunculatis.*

16. *S. eriophylla*, Ands.
17. *S. Daltoniana*, Ands.
18. *S. longiflora*, Wall.

IV. CAPRÆ.

* *Cinerascentes, stylo nudo.*

19. *S. Caprea*, L.
20. *S. julacea*, Ands.
21. *S. Wallichiana*, Ands.

** *Virescentes, stylo producto.*

22. *S. hastata*, L.
23. *S. elegans*, Wall.
24. *S. myrtilleacea*, Ands.

V. FRIGIDÆ.

25. *S. sclerophylla*, Ands.
26. *S. myricæfolia*, Ands.
27. *S. fruticulosa*, Ands.

VI. GLACIALES.

28. *S. flabellaris*, Ands.
29. *S. Thomsoniana*, Ands.
30. *S. calyculata*, Hook. f.
31. *S. Serpyllum*, Ands.
32. *S. Lindleyana*, Wall.
33. *S. oreophila*, Hook. f.
34. *S. secta*, Hook. f.

By this enumeration it may be seen that there are five European species also found in the East Indian Alps, viz. *S. daphnoides*, *S. viminalis*, *S. Smithiana*, *S. Caprea*, and *S. hastata*. But, with the exception of *S. hastata*, all the others have been determined upon a few and scarcely complete specimens. Of the rest, *S. babylonica*, *S. dealbata*, *S. glaucophylla*, and *S. sericocarpa* truly are allied to the species (*S. acmophylla*, *S. babylonica*, and *S. octandra*) of Western Asia; *S. tetrasperma* proves to be the form most peculiar to the East Indies, where it offers a great variety of interesting forms, quite as, in our own country, *S. pentandra*, with which it is somewhat analogous. *Helices*, indeed, differ from our species, although *S. pycnostachya* seems to belong to the series of *S. purpurea*, and *S. eriostachya* to that of *S. rubra*. Amongst *Vetrites*, the groups of *S. daphnoides* and *S. viminalis* are each represented by three or four species; and of *Frigidæ* and *Glaciales*, all seem to be peculiar to the Himalayan mountains.

1. *SALIX TETRASPERMA*, Roxb. *S. amentis* lateralibus pedunculatis, masculis longis laxis rarifloris, femineis cylindricis subdensifloris elongatis, pedunculo foliis 3-6 instructo; squamis oblongo-spathulatis griseo-puberulis; nectario pedicello sexies brevior; capsula longe pedicellata ovata glabra, stylo minimo, stigmatibus divis; foliis ovato-lanceolatis elongatis longe acuminatis subtus plerumque glaucis integerrimis.

S. tetrasperma, Roxb. *Pl. of the Coast of Coromandel*, i. p. 66. tab. 97; Wallich, *Catalog. Pl. Ind. orient.* no. 3707; Ands. *Ostindiens Pilar* (*Acta Holm.* 1850, p. 484. no. 14).—*S. Hugelii*, Wimm. *herb. Berol.* —*S. nilagirica*, Miquel (*Hohenacker, Pl. Indiæ or.* 1851).

Hab. Ad ripas et in locis humidis per totam (Indiam orientalem?) Nepaliā, ut videtur subfrequens. In montibus Nilagiri, Khasia reg. trop. alt. 2-4000 ped. (*Hook. et Thomson*). Nullam aliam se invenisse monet Roxburgh. Tempore frigido floret.

Hæc *Salix* formis numerosis (ut e collectione ditissima ill. *J. D. Hookeri* certior factus sum) mire ludit, et centrum, ut ita dicam, efficit *Salicum* Indiæ orientalis vere indigenarum et huic terræ propriarum; quare sequentes, a forma typica plus minus recedentes, meras varietates censeo.

**S. pyrina*, Wallich (*Catal.* n. 3705). Amentis breviter pedunculatis subrarifloris acutiusculis excurvatis, pedunculo paucifoliato, squamis subdeciduis spathulatis cinerascenti-pilosis; nectario pedicello capsulæ quadruplo breviori; capsula ex ovata basi attenuata, stylo subnullo; foliis lanceolatis acutis subtus cinereis.—Ands. *l. c.* p. 486. no. 15.

Hab. In Nepalia (*Perrottet, Wallich*).

***S. urophylla*, Lindl. (*Herb. Soc. Linn.*). Amentis foliis parvis suffultis arrectis curvatis obtusiusculis; squamis incano-pilosis; capsulis ovato-lanceolatis glaberrimis, pedicello nectarium bis terve superante, stylo brevi, stigmatibus bipartitis excurvatis; foliis glabrescentibus lanceolatis.—Wallich, *Catal.* no. 3708; Ands. *l. c.* p. 487. no. 16.

Hab. Ind. orient., Oude (*Wallich*).

****S. suaveolens* (Ands. *l. c.* p. 491. no. 19). Amentis ♂ suaveolentibus pedunculatis strictis elongatis, pedunculo foliato; squamis latissime ovatis convexis aureo-fulvis hirsutiae densa albo-tomentosis, apice summo nudis; staminibus 8-10, filamentis tenuissimis inferne barbatis, antheris globosis; foliis e basi subovata longissime acutatis glaberrimis subtus glaucescentibus, coriaceis.—*S. Myurus*, Wimm. (*herb. Vindob.*).

Hab. Ad Ajmir leg. *V. Jacquemont* (*Voyage aux Indes or.*, no. 96). Himalaya, *Hugel*, no. 526.

*****S. ichnostachya* (Lindl. hb. Wight.). Amentis pedunculatis, masculis patentibus, pedunculo foliis 2-4 instructo; squamis ovato-rotundatis dense crispo-villosis; stam. octo, filamentis basi barbatis;

foliis lanceolatis acutato-acuminatis integerrimis subtus glaucis.—Wall. Cat. no. 3702; Ands. *l. c.* p. 488. no. 17.

Hab. Ad Karikal, prope Pondichery (*Perrottet*), Nepalia (*Wallich*).

***** *S. nobilis*, Fr. Amentis subpedunculatis erectis, foliis minutis deciduis bracteatis, fem. subdensifloris, masc. rarifloris; squamis parvis rotundatis dorso glabriusculis; capsulis ovato-subulatis sæpius glabris, pedicello nectarium superante, stylo longissimo, stigmatibus fissis linearibus; foliis oblongo-lanceolatis adpresse serrulatis glabris lucidis.—Ands. *l. c.* p. 492. no. 20.

Hab. In Nepalia (*Wall. herb. Hornem.*).

Descriptiones completiores harum omnium formarum in Act. Holm. *l. c.* jam prius dedimus.

Ad hanc speciem eximie polymorpham forsitan etiam pertinent sequentes, de quibus autem valde dubitans sum :

(1.) *S. disperma*, Don (Prod. Fl. Nepal. p. 58). “Octandra: amentis masculis prælongis villosis; squamis obtusis; ovariis ventricosis tomentosis, stigmatibus 2 linearibus apice incrassatis emarginatisque; foliis ellipticis integerrimis mucronatis utrinque ramulisque sericeo-villosis.”—Roxb. MSS.; Ands. *l. c.* p. 500. no. 26.

Hab. In Nepalia (*Hamilton*).

(2.) *S. lenta*, Fr. (Nov. Fl. Suec. Mont. i. p. 78). “Foliis lanceolatis remote glanduloso-dentatis subtus villosulis canescentibus, stipulis lanatis, amentis subpedunculatis, bracteis deciduis, masc. arcuatis diandris (?), capsulis pedicellatis subulatis sericeis, stylo brevi, stigmatibus emarginatis.”—Ands. *l. c.* p. 501. no. 28.

Hab. Etiam in Nepalia.

(3.) *S. calophylla*, Wall. *l. c.* no. 9102; Ands. *l. c.* p. 502.

(4.) *S. densa*, Wall. *l. c.* p. 9103; Ands. *l. c.* p. 502.

(5.) *S. —*, Wall. *l. c.* no. 9105; Ands. *l. c.* p. 502.

(6.) *S. pseudogrisea*, Steudel (*S. grisea*, Wall. no. 3700 D, herb. Berol. et Vindob.).

2. *S. CALOSTACHYA*, Ands. (*l. c.* p. 489. no. 13). Amentis sessilibus longe cylindricis flexuosis densifloris; squamis parvis fulvis, pilis albido-griseis hirsutis, pedicello brevioribus; nectario minutissimo; capsula pedicellum elongatum filiformem æquante glabra, stylo nullo, stigmatibus erectis; foliis ovato-lanceolatis undulatis subtus argenteis glaucis.

Hab. In sylvis humidis, 2000 metr. elevatis Indiæ orient. a Kahouta ad Mahabad (*Jacquemont*, *Voy.* no. 250).

Descriptionem in Act. Holm. *l. c.* vide.

3. *S. APICULATA*, Ands. (*l. c.* p. 470. no. 1). Amentis pedunculatis erectis, foliis paucis suffultis, fem. subdensifloris; squamis caducis, apice obtuso, glabriusculis; capsulis conicis glabris, pedicello nectarium unicum bis superante, stylo mediocri, stigmatibus

divisis; foliis ovato-lanceolatis, apice longe producto, acuminatis nitentibus.

S. cuspidata, *D. Don, Prodr. Fl. Nepal.* p. 58; *Wallich, l. c.* no. 3703.

Hab. Sirinagur (*D. Kamroop*), Nilgherry (*Noton*).

Descriptionem in *Act. Holm. l. c.* dedi.—Nonne autem *S. tetrasperma* varietas?

4. *S. GLAUCOPHYLLA*, *Ands. (l. c. p. 474. no. 7).* Amentis foliato-pedunculatis erectis, femineis cylindricis rarifloris obtusiusculis; squamis subpersistentibus ovatis dense albo-villosis; nectario lato pedicello capsulæ quadruplo breviori; capsula pedicellata globoso-conica acuta glaberrima; stylo subnullo, stigmatibus brevibus; foliis elongato-lanceolatis glaberrimis integerrimis subtus glaucis.

Ex India orientali reportavit Jacquemont.

Hæc species *S. octandra* (Sieb.) sine ullo dubio valde affinis est, quæ tamen sat aperte differt: amentis crassioribus magisque densifloris, capsulis brevioribus, necnon foliis vulgo latioribus, serratis, subconcoloribus.

Descriptionem in *Act. Holm. l. c.* vide.

5. *S. DEALBATA*, *Ands. (l. c. p. 472. no. 1).* Amentis pedunculatis brevibus obtusis subdensifloris; pedunculo 1-3-foliato; squamis deciduis obovatis pubescentibus; nectario lato brevi subbifido; capsula pedicellata ovato-conica, glaberrima; stylo mediocri, stigmatibus erectis; foliis lanceolato-linearibus integerrimis subtus glaucescentibus demum dealbatis.

Hab. Inter Saharnpora et pedem montium Sulin Nauka et Mohur; in planitie secus torrentem ad Ghautka-ware (*Jacquemont*).

Descriptionem in *Act. Holm. l. c.* vide.

Habitu *S. albæ* v. *babylonicæ*, a quibus differt foliis omnino glaberrimis, sensim angustatis nec ita acuminato-productis, amentis brevioribus, capsulis evidenter pedicellatis. Magna etiam cum *S. acmophylla* Boiss. est affinitas, quæ tamen amentis globosis, densifloris, squamis glabriusculis et capsulis quodammodo differt. Tribus autem *S. albæ* et *babylonicæ* in Asia occidentali vere indigena ibi magis quam apud nos variis ludit formis.

6. *S. SERICOCARPA*, *Ands.* Amentis breve pedunculatis foliis parvis suffultis angustis elongatis flexuosis; squamis concoloribus glabris lineari-spathulatis; stam. geminis; capsulis sessilibus tenuiter sericeis conico-rostratis stylo producto bifido, stigmatibus integris erectis; foliis anguste lanceolatis utrinque glaberrimis apice producto subobliquis integris subtus glaucescentibus.

Hab. Kaschmir, reg. alp., alt. 6000 ped. (*Thomson*).

Arbor videtur, ramis erectis, subvimineis, cortice fusco-castaneo glabro obductis. Folia 2-3 pollices longa, vix semipollicem lata, basi attenuata, apice angustato-cuspidata, supra viridia, subtus læte glauca,

utrinque glaberrima, margine integerrima vel rarius minute serrulata. Amenta lateralialia, pedunculo semipollicari insidentia, patentia, foliis 2-7 parvis integris oblongis suffulta; mascula $1\frac{1}{2}$ pollicem longa, rectiuscula, rachi hirsuta, squamæ testaceo-pallidæ, stamina gemina, filamentis squamas subtriplo superantibus glabris filiformibus, antheris minutis flavis; am. fem. laxè flexuosa, 2-3 pollices longa, rachis hirsuta, squamæ obtusiusculæ apice fusciores, capsulæ lineam longæ conicæ tenuiter incano-sericeæ, nectario ventrem capsulæ tegente, stylo luteo ad medium fisso, stigmatibus infuscat.

Primo obtutu, *S. albæ* nostræ similis, abunde autem differt capsulis et squamis, necnon foliis.

7. *S. BABYLONICA*, *L. Sp. Pl.* 1773; *Ands.* (l. c. p. 472. no. 2); *Don, Prodr. Fl. Nep.* p. 59.—*S. japonica*, *Thbg., Ands.* (l. c. p. 501. no. 27). *Hab.* Kera, Tunbury, *Jacquemont*; Narainhetty Nepaliæ, *Hamilton*.

8. *S. PYCNOSTACHYA*, *Ands.* Amentis sessilibus foliis nullis suffultis; staminibus monadelphis, antheris quadrilocularibus; squamis arctis obtusiusculis apice fuscioribus basi pilosis; capsulis sessilibus ovatis glabris, stylo subnullo, stigmatibus brevibus erectis bifidis; foliis lanceolatis obtusis basi angustatis planis integerrimis utrinque glabris vel junioribus subtus præsertim sericeis.

Hab. In India orientali: Gauskar, reg. alp., alt. 13,000 ped. (*Thomson*). Frutex fere orgyialis. Rami ramulique divaricati, cortice atro-violaceo obsolete glaucescenti-irrorato lucido obducti. Stipulæ obsoletissimæ aut cito caducæ. Folia fere 2 pollices longa, supra medium vix semunciam lata, basin versus sensim angustata, apice obtusata, omnino plana, submollia, margine integerrima, juniora pilis brevibus adpressis utrinque albo-sericea, adulta glabrata, utrinque læte viridia costa dilutiori venisque ex siccatione fuscescentibus rectiusculis subsimpli-cibus percurta; petiolus $2\frac{1}{2}$ lin. longus, puberulus. Gemmæ ovato-rotundatæ, fusco-castaneæ, omnino glabræ. Amenta lateralialia præcocia, arrecto-patentia, pedunculo 2-3 lin. longo villosa insidentia, bracteis minimis dense tomentosis suffulta, densiflora, obtusa. Amenta mascula, $1\frac{1}{2}$ pollicem longa, cylindrica, rachis hirsuta; squamæ spatulato-obovatæ filamentum ad medium tegentes, brunnescentes, pilis longis albidis conspersæ; filamenta duo concreta pallide flava, basi parcissime pilosa; anthera quadrata aurea. Amenta fem. excurvata, $1\frac{1}{2}$ -2 pollices longa, cylindrica vel apicem versus fere incrassata, valde densiflora; rachis pilosa; squamæ obovato-rotundatæ basi fulvescentes, pilis longis hirsutæ, supra medium castaneo-fuscæ, glabræ vel pilis pallidis ciliatæ, capsulis plus quam duplo breviores; nectarium punctiforme, glabrum, pilis conditum, basin capsulæ vix attingens; capsula sessilis, $1\frac{1}{3}$ lin. longa, ovato-oblonga, basi gibba, acutiuscula; stylus brevissimus in stigmata brevia bipartita arrecta cyathi instar dilatatus, flavus.

Est in tribu sua habitu prorsus peculiari, hinc ad *S. rubram*, staminibus

monadelphis, foliis lineari-lanceolatis, interdum sericeo-pubescentibus, illinc ad *S. daphnoidem*, nempe amentis sessilibus valde densifloris, capsulis glabris viridulis et ramis adultis nonnunquam glauco-irroratis, accedens. Sed ab utraque magnopere differt; a *S. rubra* foliis non longe productis obtusis integerrimis, planis, stipulis nullis, capsulis glabris, stylo brevi et stigmatibus crassis; a *S. daphnoide* foliis, stigmatibus et stylo necnon staminibus.

9. *S. OXYCARPA*, *Ands.* Amentis lateralibus præcoccibus sessilibus elongatis laxè flexuosis; staminibus 2, filamentis ad medium connatis; capsulis sessilibus conico-elongatis acutis sericeo-puberulis, stylo subnullo, stigmatibus brevissimis subclavatis; foliis lanceolatis acutiusculis tenuibus, adultis rigidis glabre nitentibus, subintegris subtus glaucescentibus.

Hab. Kischthar, reg. temp. alt. 6-11,000 ped. (*T. Thomson*).

- a. angustifolia*: foliis anguste lanceolatis subtus glaucescentibus, squamis capsularum acutiusculis fuscis.
b. latifolia: foliis late lanceolatis v. oblongis subtus pallidioribus, squamis caps. rotundatis fulvescentibus.

Frutex plus quam orgyalis. Rami erecti, crassiusculi, in speciminibus masculis a me visis molliter incano-pubescentes, brunnei, in spec. fem. omnino glabri, rufescentes. Gemmæ minutissimæ, acutiusculæ, sero evolutæ. Stipulæ anguste lanceolatæ, petiolo lineam longo vix longiores, plerumque mox caduæ. Folia 3 pollices longa, pollicem lata, supra medium nonnihil latiora, ceterum æqualiter attenuata, plana, margine integra vel apicem versus minute et remote glanduloso-serulata, juniora pellucida, pilis nitentibus adpressis præsertim secus costam oblecta, demum utrinque glaberrima vel infra obsoletius puberula, supra læte viridia, subtus opace glaucescentia, costa sola distincta; petiolus lineam longus, cano-tomentosus; folia novella oblonga, obtusa, pilis adpressis plus minus dense oblecta. Amenta lateralialia, præcocia, pedunculo 3 lineas longo vel immo breviori insidentia, bracteis 2-4 vix unciam longis subtus sericeis oblongis vel obovatis suffulta. Amenta mascula patentia vel immo subrecurvata, crasse cylindrica, obtusa, densiflora, 2 pollices longa; rachis hirsuta; squamæ staminibus triplo breviores, obovato-rotundatæ, fusco-castaneæ, pilis cinereis squamarum longitudine corrugatis ciliatæ; stamina 2, filamentis usque ad medium connatis glabris flavis, antheris subrotundatis aureis. Amenta feminea arrecta vel laxissime patentia et curvato-flexuosa, 3-4 pollices longa, acutiuscula; rachis pubescens; squamæ ut in am. ♂ sed pallidiores, capsulis quadruplo breviores; nectarium squama triplo brevius, glabrum; capsula sessilis, ex ovata basi conico-attenuata, fere 2 lin. longa, apice acutata, tomento sericeo tenui pubescens, stylo parvo sed distincto, stigmatibus brevibus integris crassiusculis erectis.

Quoad folia hæc salix pulcherrima *S. phyllicæfoliæ* vel potius *S. laurina angustifoliæ* simillima videtur; amenta feminea non ab iis harum

specierum multum aberrant; adsunt autem capsulæ sessiles stylo minuto rostratæ; præterea stamina monadelpha? Cum speciebus ad *Helices* vulgo relatas hæc nostra ceterum parum habet commune. E *S. cinerea* et *S. laurina* quasi composita videtur! Et ob id *S. julacea* nostra huic quam maxime affinis; quæ tamen differt foliis frequentius hirsutis vel sericeis, capsulis adhuc longius attenuatis et stigmatibus prorsus sessilibus.

Huc sine dubio ea *Salicis* species referenda est, quam nomine *S. (phyllicifolia) macrocarpa*, *l. c.* p. 449. no. 11, "in frigidis umbrosis et fertilibus a Stari ad Korenass," lectam a Jacquemont, fusius descripsi. Cui etiam forsitan est associanda *S. glabrescens* Lindl. "in Oude et Rohilcund," Wallich (Catalog. no. 3706).

a. *breviuscula* amentis fere duplo brevioribus; capsulis tomento sericeo tenuiori parcius puberulis, demum fere glabratis; foliis anguste lanceolatis, margine sæpius remote serrulatis, utrinque glabris, subtus glaucescentibus.

Hab. Janskar, reg. alp., alt. 10–17,000 ped. (*Thomson*).

Non absque hæsitacione permulta hanc formam *S. oxycarpæ* subsumendam suspicor. Recedit quidem foliis, ramis angustioribus cortice fusco obductis, totoque habitu, nullis autem notis amentorum et capsularum ab ea distingui potest. Ad *Salicem rubram* foliorum forma nonnihil appropinquat.

b. *serratifolia*: foliis 3-pollicaribus exacte lanceolatis cuspidato-productis, venis et costa flavescentibus elevatis pulchre et regulariter striatis, subtus intense glaucis, margine minute sed satis acute glanduloso-serrulatis; amentis (deffloratis) 4–5 pollices longis, laxissimis.

Hab. Linla, reg. temp., alt. 8000 ped. (*Thomson*).

Quoad folia hæc speciei forma *S. daphnoidi* ita est similis, ut ab ea non nisi amentis longissimis, breve sed distincte pedunculatis et foliis parvis suffultis, capsulis breve pedicellatis, conico-rostratis, squamis denique testaceis glabriusculis differt.

10. *S. ERIOSTACHYA*, *Wall.* (*l. c.* no. 3704). Amentis lateralibus, femineis densifloris; pedunculis foliatis; squamis obovato-rotundatis pilosiusculis; nectario ventrem capsulæ attingente; capsula sessili ovato-conica albo-villosa, stylo elongato, stigmatibus bipartitis; foliis subovalibus obtusiusculis integerrimis subtus glaucis.—*Ands. l. c.* p. 493. no. 21. Descriptionem *l. c.* etiam vide.

Hab. In Nepalia, ad Gossain Than.

Distinctissima species ob amenta capsulasque cum nulla alia confundenda. Foliis tamen cum *S. daphnoide*, amentis cum *S. rubra* nonnihil commune habet.

11. *S. DAPHNOIDES*, *L.*; v. *INDICA*, *Ands.* (*l. c.* p. 475. no. 5).

Hab. In summa valle Jumna, supra fontem thermalem, 2500–3300 metr. alt. (*Jacquemont*).

Specimina hic lecta a vera *S. daphnoides* non parum discrepant: amentis magis excurvatis, squamis longioribus acutatis, stylo valde producto, folisque utrinque viridibus, tenuioribus.

Alia ad "Banhatta, 2952 metr." etiam a Jacquemont lecta, cum *S. daphnoides* subbene congruunt.

12. *S. INSIGNIS*, *Ands.* Amentis sessilibus e gemmis magnis erumpentibus basi nudis, masculis crassis, squamis atris flavescenti-pilosis, staminibus geminis; femineis laxe erectis elongato-cylindricis acutiusculis, squamis atris obtusis glabriusculis, capsulis breve pedicellatis conicis sericeis, stylo evidenti, stigmatibus crassiusculis erectis; foliis lanceolatis tenuiter serratis rigidis subtus glaucescentibus, stipulis semicordatis acutis persistentibus.

Foliis latioribus glabris.

Hab. Kaschmir, reg. temp., alt. 6-8000 ped. (*Thomson*).

Foliis angustioribus, longius acuminato-cuspidatis, utrinque cinereo-tomentosis.

Hab. Tibet. occident., reg. temp., alt. 6-8000 ped. (*Thomson*).

Arbor vel frutex videtur sat altus. Rami validi, cortice rufo-fusco vel castaneo glabro nitente rarissime glaucescente obducti. Gemmæ ovato-conicæ apice acuto incurvæ intrafoliares pedunculo subduplo breviores fusco-castaneæ glabræ vel hirsutiae parca puberulæ, floriferæ late ovatæ 2-3 lineas longæ glabræ castaneæ. Folia 3 pollices longa, ad medium pollicem lata, exacte lanceolata, basi et apice æqualiter angustata, margine glanduloso-serrata serraturis subdepressis, supra læte viridia nitentia costa et venis regulariter arcuatis dilutioribus percursa, subtus pallidiora vel glaucescentia costa et venis striata; pedunculus 2 lin. longus, basi dilatatus gemmam amplexans. Stipulæ semi-ovatæ vel late lanceolatæ basi obsolete cordatæ, longissime cuspidatæ, erectæ, latere exteriori arcuato minute serrulatæ, glabræ vel hirsutæ. Amenta mascula pollicem longa ovato-oblonga vel oblongo-ovalia, omnino sessilia, foliis vel bracteis nullis sed perulis magnis sat diu persistentibus suffulta; squamæ ovato-ovales, obtusæ, aterrimæ, pilis longis cinereo-flavescentibus utrinque sericeæ; stamina gemina, squamas triplo superantia, filamentis flavis, antheris minutis fulvescentibus. Amenta feminea etiam sessilia foliis nullis sed bracteis paucis et parvis villosis suffulta, cylindrica apicem versus angustiora laxè flexuosa, sæpe 2 pollices longa, 2-3 lin. lata; squamæ lanceolatæ acutiusculæ atræ, pilis paucis et brevissimis vel plane nullis basi conspersæ; capsulæ anguste conicæ rostratæ, tenuiter griseo-sericeæ, pedicello nectarium bis superante pallido, stylo parum producto sed conspicuo etiam pallidiori, stigmatibus crassis integris erectis.

Hæc species ex habitu ad *S. daphnoidem* aperte pertinere videtur præsertim quoad folia, gemmas et stipulas, amenta etiam mascula illius sat similia sunt; differt autem amentis femineis longis laxis, squamis atris nudis nec longe pilosis, capsulis evidenter pedicellatis. Eo respectu, ut etiam stylo minuto et amentorum habitu ad *Capreas* vergit.

13. *S. VIMINALIS*, *L. Sp.* 1448; *Ands. l. c.* p. 475. no. 6.

Hab. A Castris ad Hirpour (*Jacquemont*).

14. *S. SMITHIANA*, *Willd. Enum. H. Berol.* ii. p. 1008.

Hab. Sikkim, reg. temp., alt. 5–8000 ped. (*J. D. Hooker*).

Specimen tantum foliiferum in herb. *Hooker*. vidi, quod non sine dubio ad hanc speciem referendum puto.

15. *S. POPULIFOLIA*, *Ands. l. c.* p. 497. no. 22. Amentis sessilibus densifloris cylindricis obtusis foliis minoribus bracteatis; squamis oblongis tomentosis; nectario minuto pedicellum brevissimum capsulae superante; capsula subsessili globoso-conica albo-lanata; stylo nullo, stigmatibus cruciatis; foliis longissime petiolatis ovalibus tenuibus glabrescentibus acute crenatis.

Hab. In India orientali legg. *Perrottet et Jacquemont*.

Descriptionem in *Actis Holm. l. c.* dedi.

16. *S. ERIOPHYLLA*, *Ands.* Amentis breve pedunculatis subcoëta-neis foliis parvis suffultis; capsulis sessilibus obtusis tomento albescenti lanatis squamas villosas quadruplo superantibus; stylo profunde bipartito, stigmatibus bifidis erectiusculis fuscis; foliis lanceolatis acutis subtus argenteo-tomentosis margine dentatis supra rugose venosis.

S. psilostigma, *Ands. l. c.* p. 496. no. 23.

Hab. Khasia, reg. temp., alt. 4–5000 ped. (*J. D. Hooker et Thomson*).

In collectione *Jacquemontii* Parisiis vidi, sed tantum specimina manca.

Frutex sat altus, facie omnino *S. viminalis*. Rami dense foliati, cortice fusco-cinerascente glabro (in ramis floriferis) vel tomentoso (in ramis foliatis) obducti. Folia novella subtus adpresse argenteo-villosa costa prominula, supra obscure viridia parce pilosa, margine integro exsiccatione revoluta, exacte lanceolata, etiam basi æqualiter angustata; adulta $2\frac{1}{2}$ –4 pollices longa, petiolo lineam longo basi dilatato breve petiolata, erecto-patentia, infra medium subovata, inde longius attenuata, apice recto acuta, margine angustissime subrevoluto dense sed non profunde denticulata, subtus tomento non plane adpresso opace argenteo plerumque micante densissime vestita, costa lata pallidiore et venis distinctioribus prominulis percursa, supra saturate viridia tomento raro adpresso sub lente distincto mollia, costa pallidiori medio lineata venis lateralibus ante marginem incurvatis medio partitis impressis rugosa. Stipulae in ramis vegetis et surculis persistentes, ex ovata vel etiam subcoordata basi acutatae, 3–4 lin. longae, infra medium 2–3 lin. latae, subobliquae, nervis impressis rugosae, margine subreflexo dentato, subtus albo-tomentosae. Gemmae ovato-globosae, cano-hirtae, petiolum (a quo basi inclusae sunt) longitudine æquantes. Amenta lateralia pedunculo semipollicari insidentia, arrecta vel incurvato-patentia; folia bracteantia 4–5 minuta plerumque semipollicaria, apicem versus latiora, ceterum foliis novellis similia. Amenta mascula pollicaria,

rectiuscula, anguste cylindrica, densiflora, e basi primo florentia, obtusa; rachis hirsuta; squamæ obovato-rotundatæ, castaneo-fulvescentes, utrinque sed extus longius albo-villosæ; stamina 2, squamas duplo tantum superantia; filamenta tota pilis albis hirta; antheræ parvæ aureæ. Amenta feminea $1\frac{1}{2}$ -2-pollicaria, patentia, rectiuscula v. subflexuosa, anguste cylindrica, obtusa, densiflora; rachis cinereo-tomentosa; squamæ capsulis fere duplo breviores, pallide fuscæ, obovato-rotundatæ, extus pilis albescentibus sat longis villosissimæ; nectarium porrectum, capsulæ dimidia longitudine, glabrum, fuscum, truncatum; capsula vix semilineam longa, ovato-conica obtusissima v. subglobosa, omnino sessilis, pilis albis opace sericeo-micantibus densissime vestita; stylus fuscus fere usque ad basin partitus et pilis capsulæ fere obtectus; stigmata in singulo stylo duo, testacea, stylis triplo breviora, divaricata.

Quod ad folia hæc species *S. viminalem* v. *stipularem* valde simulat; fabrica autem amentorum longissime ab ea differt.

17. *S. DALTONIANA*, *Ands.* Amentis pedunculatis foliis bracteatis longissimis laxiusculis; squamis capsulas ultra medium tegentibus pilosis; capsulis primo sericeis demum glabratis conico-rostratis sessilibus; stylo longissimo bipartito; stigmatibus filiformibus; foliis lanceolatis integris vel minutissime glanduloso-serrulatis planis supra demum glabris subtus ferrugineo-sericeis.

Hab. Sikkim, reg. temp., alt. 9000-14,500 ped. (*J. D. Hooker*).

Arbor haud excelsa videtur. Rami strictiusculi, cortice atro-piceo glabro obducti; ramuli cinerei parcissime puberuli. Folia juniora pollicaria, late lanceolata, utrinque hirsuta sed præsertim subtus lucide sericea, adulta 3-7 pollices longa, in medio pollice sublitoria basi et apice acuta, superne obscure viridia costa venisque parallelo-arcuatis impressa cinerea, ceterum glabra nitentia, subtus tomento adpresso cinereo-cupreo rufescentia, costa subelevata, margine aut integerrima aut serraturis minutis et sat remotis glanduligeris obscure denticulata; petiolus 2-3 lin. longus cinereo-pubescent. Stipulæ nullæ persistentes. Gemmæ parvæ hirsutæ. Amenta lateralia pedunculata; pedunculus foliis 3-5, ceteris duplo minoribus, basi subrotundis instructus. Amenta mascula erecto-patentia, fere bipollicaria, 2 lin. crassa, rachis incano-pilosa; squamæ cuneatæ, dorso glabræ nervosæ, staminibus duplo triplo breviores, fulvescentes; stamina gemina, filamentis ad medium dense hirsutis, fulvis; antheris rotundatis, aureis. Amenta feminea erecto-patentia, demum 4-6-pollicaria, laxiuscula, subdensiflora, acuta; squamæ spathulatæ, subcastaneæ, pilis griseis hirtæ, capsulæ dimidiam mediam inferiorem tegentes, demum ea quadruplo breviores; nectarium basin capsulæ attingens; capsula fusco-rufescens, conico-acutata, pilis brevibus adpressis primo sericea, demum calva; stylus piceus, valde elongatus (longitudinē capsulæ), ad medium fissus; stigmata divaricata, brevissima, pallidiora.

Variare videtur foliis anguste lanceolatis utrinque attenuatis (fere ut in

S. viminali) et fol. ovalibus, basi subrotundatis (fere ut in *S. Smithiana*). Nulli formæ Salicis cujusdam europeæ similis, a *S. viminali* et affinibus longissime recedit annulis pedunculatis; a *S. phylicifolia* capsulis sessilibus; ab omnibus amentis femineis longissimis, capsulis acutatis, stylo eximio producto et bipartito, foliis subtus rufescenti-sericeis.

18. *S. LONGIFLORA*, *Wall.* (sec. specimen in herb. Hookeri). Amentis breve pedunculatis foliis 2-3 parvis suffultis gracillimis laxè pendulis densifloris; squamis fusco-testaceis obtusis glabris vel sparse pubescentibus; capsulis sessilibus crasse ovatis acutis glaberrimis; stylo brevi; stigmatibus partitis erectis; foliis anguste lanceolatis acutis integerrimis subtus pallidioribus nonnunquam tenuiter sericeis.

Hab. in India orientali (*Wallich*); Sikkim reg. temp., alt. 9000 ped. leg. *J. D. Hooker*.

Arbuscula 10-pedalis, ramosa; ramuli breves, fere rectangulariter divaricati, glabri, cortice fusco-nigricante obducti. Gemmæ parvæ, vix lineam longæ, adpressæ; sæpius pallescentes. Folia alterna, patentia, petiolata, adulta $1\frac{1}{2}$ vel $2\frac{1}{2}$ pollices longa, semiunciam et plus lata, exacte lanceolata, basi et apice angustata, margine omnino integerrima, utrinque glaberrima, supra obscure viridia, costa lucida et parce pilosa percursa; subtus juniora glaucescentia, costa et nervis fuscoribus lineata, adulta opaca et dilutiora; petiolus 2 lin. longus, parce pilosus, in foliis novellis multo brevior. Amenta lateralia, patentia-pendula, adulta 2-4-pollicaria, 2 lin. crassa, valde densiflora, subflexuosa, exacte cylindrica, apice acutiuscula; pedunculus semipollicem longus, foliis 2-4 suboblongis vix pollicaribus subtus glaucescentibus vestitus. Rachis ob capsulas condensatas scrobiculata, brevius hirta; squamæ semilinea longiores, subspathulatæ, brunneo-testaceæ apice subfusciore, dorso glabriusculæ vel parce puberulæ, basin capsulæ vix attingentes; nectarium minutum; capsula ex ovata et crassa basi brevissime conica, $\frac{3}{4}$ lin. longa, fere omnino sessilis, glabra, viridi-brunnescens; stylus obsoletus apice bifidus; stigmata bipartita, laciniis divaricatis.

19. *S. CAPREA*, *L. Sp.* 1448. Folia tantum vidi, ad hanc speciem forsitan referenda. *Ands. l. c.* p. 476. n. 7.

20. *S. JULACEA*, *Ands. l. c.* p. 476. n. 8. Amentis sessilibus longissimis attenuatis squamis glabrescentibus; capsulis ovato-linearibus vix pubescentibus, pedicello nectarium ter quaterve superante, stylo nullo, stigmatibus erectis; foliis oblongis obtusiusculis subtus argenteo-pilosis; gemmis ramisque glabris.

Hab. In sylvis excelsis supra Hyderabad, alt. 2600-2730 metr. (*Jacquemont*).

Descriptionem in *Act. Holm. l. c.* vide.

21. *S. WALLICHIANA*, *Ands. l. c.* p. 477. n. 9. Amentis sessilibus attenuatis erectis, fem. densifloris, masc. arcuatis; squamis basi hir-

sutis; capsulis conicis elongatis cano-villosis; pedicello nectarium minutum bis superante; stylo nullo, stigmatibus erectis; foliis oblongis abrupte acuminatis glabris coriaceis; gemmis glabriusculis; ramulis pulverulis.

Salix grisea, Wall. *Catalog.* n. 3700.

Hab. In Nepalia, Kamaon, Silhet (*Wallich*), Kalimath (*Strachey et Winterbottom*), Himalaya bor.-occ., regio temp. alt. 6000–9000 ped. (*Thomson*).

Descriptionem in Act. Holm. l. c. vide.

22. *S. HASTATA*, L., sp. 1443; *Ands. l. c.* p. 479. n. 10.

Specimina, quæ, a Jacquemont reportata, in herb. Parisiensi vidi, ab europæis nullo modo differunt, duabus formis ludentia: 1. *rotundifolia*: foliis rigidis, acute serratis, cortice ramorum fusco-roseo; 2. *oblongifolia*: foliis tenuioribus, fruticulus minimus. Quæ tamen in herb. Hookeriano (Tibet, reg. alp., alt. 11,000–15,000 ped.) examinavi, a nostris in eo recedunt, quod amenta multo præcociora videntur, aut omnino sessilia, aut bracteis paucis parum evolutis suffulta.

23. *S. ELEGANS*, Wall. l. c. n. 3699. Amentis pedunculatis, masc. brevibus obtusis erectis, fem. gracillimis laxè subpendulis acutis; squamis parvis pallide flavis apice glabris, nectario pedicellum capsulæ subæquante; capsula brevissime pedicellata conica glaberrima; stigmatibus sessilibus bipartitis; foliis (obovato-) lanceolatis serrulatis subtus intense glaucis demum rigidis utrinque glaberrimis.

S. Kamanensis, Lindl. Wall. l. c. n. 3701; *S. denticulata*, *Ands.*, l. c. p. 481. n. 12.

Hab. In India superiori alpestri in regionibus Himalensibus ad Baltal (*Jacquemont*); in Kamaon (*R. Blinkworth*); Himalaya boreal.-occid.; reg. temp. 6000–9000 ped. (*Thomson*); Niti, Garhwal, 11,500 ped. (*Strachey et Winterbottom*).

Descriptionem in Act. Holm. l. c. vide.

Species nitidissima alpestris, ob folia et habitum totum necnon amentorum et capsularum forma inter *S. phylicæfoliam* et *S. hastulatam* quodammodo media, posteriori autem sine ullo dubio proxima.

**S. himalensis*, Klotzsch (herb. Berolin.). Magnitudine altiori, foliis majoribus magis elongatis apicem versus attenuatis exacte lanceolatis margine acutius dentatis basi æqualiter angustatis subtus evidentius cæsiis.—*S. Govaniana*, Wall. Cat. n. 3699.

Hab. In Nepalia (*Wallich*); Sirmore (*Govan et Kamrup*); in alpihus Himalensibus (*Hofmeister*).

24. *S. MYRTILLACEA*, *Ands.* Amentis sessilibus crassiusculis curvatis densifloris; squamis acutatis nigricantibus basi pilosiusculis; capsulis conicis puberulis subsessilibus, stylo producto, stigmatibus indivisis; foliis rigidiusculis ellipticis integerrimis glaberrimis subtus opacis venulosis.

Hab. Sikkim, reg. alp., alt. 12,000 ped. (*J. D. Hooker*).

*Frutex mediocris altitudinis. Rami sat robusti, ramosi, toruloso-angulati, cortice fusco-castaneo vel cinereo nigrescente glaberrimo nitente obducti. Folia dense conferta, petiolo glabro lutescente vix lineam longo brevissime petiolata, pollicaria, semipollicem lata, supra medium frequenter latiora, basi subrotunda vel rarius subangustata, apice acutiuscula, margine acuto subrevoluto integerrima, utrinque pure at subtus dilutius virescentia, lucida, plana, venis et præsertim costa fulvescenti subtus elevatis pulchre striata, juniora subpellucido-rufescentia, adulta membranaceo-rigida. Amenta (mascula non vidi) præcocia, omnino sessilia, nullis foliis evolutis suffulta, pollicem longa, curvata; squamæ ovatæ, acutæ, fusco-nigricantes, pilis sat longis basi obsita, capsulam basi amplexantes et eam dimidiam apice acutæ æquantes; capsulæ testaceo-fuscæ, pubescentia brevi subsericeæ, ex ovata basi conico-angustatæ, lineam longæ, stylo sat evidente rostratæ. Habitu fruticis, forma, consistentia, nervatione, glabritie et colore foliorum *Salici myrtilloidi* omnino est similis, ut forsitan ab ea vix tute distinguenda. Differt autem: amentis (quæ tamen non nisi jam deflorata vidi) certe sessilibus, foliis nullis bracteatis, capsulis brevioribus etiam sessilibus, stylo denique evidenter producto.*

25. *S. SCLEROPHYLLA, Ands.* Amentis sessilibus nudis e gemmis maximis erumpentibus; stam. 2 liberis; squamis ovatis concoloribus seu apice subinfuscatibus margine pilosis; capsulis sessilibus conicis rostratis sericeo-puberulis cinerascensibus, nectario ventrem capsulæ tegente, stylo obsoleto fusco, stigmatibus erectis; foliis ovalibus basi rotundatis integerrimis coriaceis planis.

Hab. Laptak Tibetiæ (*Strachey et Winterbottom*) et Dras Himalayæ, alt. 10,000–15,000 ped. (*Thomson*).

Frutex ut videtur humilis. Rami divisi et divaricati, crassiusculi, torulosi, cortice fusco sæpius glauco-irrorato obducti. Gemmæ intrafoliæ ovato-conicæ, apice subincurvo productæ, intus planæ, extus trigono-teretiusculæ, basi fuscæ sæpe irrorato-glaucæ, apice testaceo-pallidiores, petiolum sæpissime superantes; gemmæ florales sat magnæ, perulis castaneo-nitentibus diu persistentibus inclusæ. Folia juniora exacte elliptica utrinque adpressa, sericea, integerrima et glabra, subtus pallidiora, adulta pollice fere longiora, $\frac{3}{4}$ poll. lata, rotundato-ovalia, basi late rotundata immo obsolete subcordata, apice vix producta, venis arcuatis valde distinctis venulosa, pure viridia, subtus pallidiora, coriaceo-dura, plana, utrinque glabra, margine omnino integerrimo interdum subrevoluta; petiolus vix lineam longus basi in gemmæ latitudinem dilatatus. Amenta sessilia nudiuscula vel bracteis minutis suffulta, breviora (vix semipollicem longa et 2 lin. crassa), ovali-oblonga, obtusa; amenta mascula arrecta, ramo adpressa; squamæ ovato-subrotundatæ, pallidæ apice subinfuscatæ, superne tenuissime et breviter pilosiusculæ, venis obscurioribus percursæ; stamina gemina libera, filamentis glabris luteis squamam triplo superantibus, antheris rotundatis fulvescentibus. Amenta feminea hori-

zontaliter excurvata vel recurvata; squamæ ut in amentis masculis, sed apice evidentius ciliatæ; capsulæ sessiles, ovato-conicæ, pube cinerea inferne rariori puberulæ; nectarium crassum truncatum; stylus brevis sed evidens, fuscus; stigmata brevissima, erecta, etiam fusca.

Hæc species nostræ *S. repenti* admodum similis eique sine ullo dubio proxime analogæ; a qua tamen bene differt: ramis glauco-irroratis, foliis margine parum revoluta exsiccatione nullo modo nigrescentibus sed planioribus, amentis et capsulis omnino sessilibus, stylo vix producto. Ramis et gemmis magnis conicis subincurvis affinitatem cum *S. daphnoides* præbet sat magnam; folia et amenta tamen recedunt.

26. *S. MYRICÆFOLIA*, *Ands. l. c.* p. 483, no. 13. Amentis sessilibus brevibus crassis densifloris subbracteatis; squamis obovato-spathulatis barbatis; nectario brevissimo; capsula sessili ovato-conica albosericæa; stylo nullo; stigmatibus erectis; foliis lingulato-oblongis integerrimis coriaceis opacis subtus pallidioribus.

Hab. In India superiori orientali (*Jacquemont et Perrottet*).

Descriptionem in *Act. Holm. l. c.* vide.

Est e tribu *S. repentis*, *Salici sibiricæ* etiam quodammodo similis, sed foliis opace cinerascentibus, amentis brevissimis et horizontaliter patentibus, squamis exacte spathulatis apice subtruncatis necnon capsulis sessilibus alto-tomentosis stylo producto destitutis, bene distincta. Folia nunc latiora et subovalia, nunc angustiora et plus minus lanceolata, incana vel glabrescentia variant; semper autem rigida, opaca, et subtus pallidiora.

27. *S. FRUTICULOSA*, *Ands.* Amentis lateralibus subsessilibus bracteis nullis aut parvis et perulis magnis suffultis ovalibus densifloris; squamis rotundato-obovatis infuscatis glabris; capsulis sessilibus ovatis subrostratis dense cinereo-villosis, nectario basin capsulæ tegente, stylo obsoleto, stigmatibus erectis; foliis anguste lanceolatis glaberrimis integris, subtus glaucis.

Hab. Pindari, Kumaon (*Strachey et Winterbottom*); Janshar, reg. alp., alt. 15,000 ped. (*Thomson*).

Fruticulus parvus fere semipedalis vel ultra; rami validi, intricati, torulosi, cortice glabro fusco-nitente vel testaceo interdum glaucescente obducti. Gemmæ sub margine conicæ castaneæ, adpressæ, obtusiusculæ. Folia vix unciam longa, $1\frac{1}{2}$ –3 lineas lata, basi et apice æqualiter attenuata, margine omnino integerrima, subrevoluta, supra læte viridia, subtus pallide glaucescentia. Amenta mascula pedunculo brevissimo laterali foliis minutis instructo insidentia, vix semipollicem longa, rachis hirsuta, squamæ obovato-spathulatæ, filamenta gemina libera, obscurius flava, glabra, squamam triplo superantia, antheræ sat magnæ demum fusæ. Amenta feminea lateralia, vix pedunculata, foliis perpaucis minimis suffulta, brevissima (2 lin. longa) ovato-ovalia; rachis puberula; squamæ rotundatæ, apice subinfuscatæ ceterum flavescences, capsulam ad mediam involventes; capsula sessilis, anguste conica

dense sericea, cinerascens, nectario basin superante; stylus vix conspicuus; stigmata brevissima, erecta, nigricantia.

Est frutex parvus inter *S. hastifoliam* nostram et *S. arbusculam* forsan medius. Differt autem foliis minutis integerrimis subtus glaucis, capsulis sessilibus et stylo nullo conspicuus.

28. *S. FLABELLARIS*, *Ands. l. c.* p. 497, n. 24. Amentis ex apice ramorum annotinorum, fem. subdensifloris; squamis obovato-rotundatis glaberrimis; nectario basin capsulæ superante; capsula subsessili ovato-conica glaberrima; stylo mediocri, stigmatibus bipartitis; foliis obovato-rotundatis vel lingulatis glabris crenatis subtus pallide viridibus; trunco procumbente, ramis flabelliformibus.

S. lucida, Jacquemont, n. 1600. *S. obovata*, Wall., n. 3698.

S. rotundifolia, Royle, Klotzsch. herb. berol.

Hab. In humidis herbosis sub jugis versus Soogrum, alt. 4000 metr. (Jacquemont); and Kamaon (Wallich). In alpinis Himalensibus (W. Hofmeister); Kunawur, reg. alp., alt. 15,000 ped. (Thomson).

Descriptionem in Act. Holm. l. c. vide.

Modus crescendi omnino ut in *S. retusa*, sed consistentia foliorum fere ut in *S. hastata*, amenta iis *S. hastatæ hyperboreæ* Fr. non parum similia. Cæterum, ut facile omnes species hujus generis vere alpinæ, admodum variat.

Foliis (1) *subrotundis*, basi dilatatis, apice rotundatis.—Hæc *S. herbaceæ* non dissimilis.

(2) *obovatis*, basi eximie angustatis, apice dilatatis et sæpe emarginatis.—Hæc forma speciei est typica, modificationes maximas *retusæ* æmulans.

(3) *spathulatis*, basi sensim angustatis, apice producto, acutiusculo angustis.—Hæc formis maxime alpinis et parvis *S. hastatæ* analoga.

Amentis (1) *brevibus* crassis; in formis minimis.

(2) *longis* subrarifloris; in formis maxime elatis.

29. *S. THOMSONIANA*, *Ands.* Amentis in ramulis elongatis annotinis terminalibus elongatis cylindricis, masculis laxifloris, femineis subdensifloris; squamis obovato-rotundatis hirsutis; nectario producto fere ad mediam capsulam attingente; capsula subglobosa albopilosa; stylo producto, stigmatibus crassis integris divaricatis; foliis lanceolatis subtus incano-villosis nervis albo-lineatis tenuiter et remote serrulatis.—*S. vagans*, Hook. f. (herb. Ind. orient.).

Hab. Sikkim, reg. temp., alt. 10,000 ped. (Hooker et Thomson).

Fruticulus subpedalis, trunco sat valido repente, ramis adscendentibus torulosis, cortice fusco nitente obductis. Folia lanceolata, utrinque attenuata, plana, margine tenuissime revoluta, remote serrulata, supra obscure viridia et glabra, subtus incano-hirta, secundum nervos arcuatos sericea. Amenta sat longa; masc. usque ad 2 pollices producta, laxè patentia, flexuosa, remotiflora; squamæ atræ, densissime cinereo-

hirsutæ; stamina et antheræ minutæ, fuscescentes. Amenta feminea breviora, angusta, magisque densiflora saltem parte superiore; squamæ atro-fuscæ rotundatæ capsulam mediam superantes, convexæ, pilis raris conspersæ; nectarium angustum, subcapitatum, squama parum brevius, ventrem capsulæ superans; capsula globosa, omnino sessilis, pube cinerea tomentosa; stylus rectus, semilineam longus, ater; stigmata stylo tertia parte breviora, indivisa, rectangulariter divaricata.

Habitu amentorum et forma capsularum solæ *S. reticulatæ* similis, foliis autem *S. arbusculæ* proxima.

30. *S. CALYCVLATA*, *Hook. fil.* herb. Ind. orient. Amentis terminalibus sessilibus oblongis, masc. diandris; capsulis breviter pedicellatis ovatis glabris, stylo mediocri, stigmatibus brevibus; foliis obovatis crenulato-dentatis petiolatis subtus pallidioribus junioribus villosis, venis supra impressis.

Hab. Sikkim, reg. alpina, 14,000–15,000 ped. alt. (*J. D. Hooker*).

Fruticulus parvus, ad summum semipedalis, adscendens; truncus penna passerina crassior, cortice fusco rugoso obductus, inferiore parte radicans; rami arrecti, subfastigiati, apice ramulosi, foliati et cortice pallidiori obducti. Stipulæ nullæ conspicuæ. Gemmæ mediocres fusco-rufescentes, ovales, glabræ, adpressæ. Folia plerumque vix pollicem longa, 3–7 lin. lata, supra medium dilatata, subrotunda, ibique serraturis subdepressis, apice minoribus crenata, juniora utrinque, præsertim autem subtus et secus costam, pilis argenteis adpressis subvillosa, demum omnino glabra; supra obscure viridia, venis impressis subangulosa, subtus pallidiora non autem glaucescentia venis obscurioribus prominulis venulosa; petiolus $\frac{1}{2}$ –lin. longus. Amenta mascula ovali-rotundata, foliis fulcrantibus suboculta; squamæ ligulato-obovata, fuscæ, glabræ, staminibus 2 triplo breviores; filamenta glabra, libera, demum subpicea, antheræ ovales exsiccatione fuscescentes. Amenta feminea etiam terminalia, sub-rotunda; squamæ ut in amentis masculis; capsulæ ex ovata basi conicæ, glaberrimæ, piceæ, pedicello nectarium glaberrimum subduplo superante.

Monstrositas in herbario adest, staminibus sc. in tubum, capsulæ apertæ instar, supra crassiorem ibique bifidum concretis, laciniis ovatis acutis intus subantheriferis, basi squama ampliata velatis.

Proxima est sine dubio speciei sequenti, sed differt: trunco multo humiliori nec flabellatim repente, ramis divaricatis nec unilateraliter erectis, foliis duplo latoribus aut integris aut obsolete crenulatis, squamis capsularum elongato-spathulatis glabris cum capsulis distinctius pedicellatis rufo-piceis.

31. *S. SERPYLLUM*, *Ands.* Amentis in ramulis annotinis terminalibus longius et distincte pedunculatis, masc. diandris; capsulis sessilibus glabris squamas involucrales apice superantibus, stylo elongato filiformi apice bipartito, stigmatibus bifidis laciniis brevissimis excurvis; foliis parvis ligulato-lanceolatis planis apicem versus utrinque 3-den-

tatis ceterum integerrimis breviter petiolatis subtus pallidioribus; trunco repente, ramis arrectis foliosis.—*S. longipes*, Hook. *fl.* (herb. Ind. orient.).

Hab. Sikkim, reg. subalp., alt. 10,000–17,000 ped. (*J. D. Hooker*).

Est fruticulus humilis, procumbens, radicans-repens, pedalis, trunco pennam anserinam crasso, ramis simplicibus arrectis foliatis apice floriferis puberulis, 2–4 uncias longis. Stipulae nullae persistentes. Folia in ramulis quasi distiche condensata, circiter 3 lin. longa, supra medium linea sublatis, lingulato-lanceolata, basin versus attenuata, apice argute denticulata, plana, glaberrima, subtus subglaucescenti-pallidiora venisque lineata, supra dense viridia costa impressa; petiolus semilineam longus, gracilis. Gemmae, e quibus rami erumpunt, perulis luteis glabris obtectae. Amenta terminalia, pollicaria, subclavata, densiflora, erecta. Amenta mascula: rachis aureo-pilosa; squamae rotundato-obovatae, intus et margine pilosae, dorso nigricantes, staminibus triplo breviores; filamenta tenuissima, basi (ubi a squama teguntur) dense pilosa, ceterum glabra obscure fusca; antherae minutae oblongae, exsiccatione flavo-virescentes. Amenta feminea primo semipollicaria et claviformia, demum cylindrica, 1½ poll. longa; rachis hirsuta; squamae obovato-cuneatae fuscae, pilis crispatis cinereis ubique pilosae, demum denudatae, sub florescentia germina fere tota obtegentes, deinde capsulis fere duplo breviores; capsula conica, attenuato-apiculata, omnino sessilis, glabra, fusco-brunnea; nectarium basin capsulae superans; stylus filiformis, capsula vix duplo brevior, fusco-castaneus, fere ad medium bipartitus, laciniis erectis filiformibus; stigmata brevissima, pallidiora, bifida, divaricata.

Distinctissima est species, crescendi modo (fere ut in thymo serpyllo) ramis et foliis ab omnibus diversa. Quod ad formam amentorum eorumque partium attinet proxima est *S. myrsinites*, quae tamen abunde differt.

32. *S. LINDLEYANA*, Wallich, *l. c.* no. 13,697. Amentis in apice ramulorum annotinorum brevibus ovato-rotundatis; squamis ovatis glaberrimis capsula duplo brevioribus; capsula breviter pedicellata conica glaberrima; stylo producto, stigmatibus incrassatis; foliis ovali-lanceolatis crenulatis glaberrimis subtus pallidioribus.—*Ands. l. c.* p. 199, no. 25.

Hab. In India superiori, ad Gossain Than, ad Kumaon (*Blinkworth, sec. Wallich*), Sikkim, reg. alp., alt. 16,000 ped. (*J. D. Hooker*), et Barje Kung pass, Kumaon, 17,000 ped. alt. (*Strachey et Winterbottom*, 17).

- (1) *latifolia*: foliis condensatis, 3–4 lin. longis, 1–2 lin. latis, apicem versus subserrulatis.
- (2) *microphylla*: foliis valde condensatis, 2–3 lin. longis, lineam latis, costa impressa profunde canaliculatis, margine revolutis. Fruticulus habitum *Azaleae procumbentis* non male referens.

Descriptionem in Act. Holm. *l. c.* vide.

33. *S. OREOPHILA*, *Hook. fil. (Herb. Ind. Orient.)*. Amentis sessilibus foliis subobtectis minimis paucifloris; masc. diandris; capsulis subsessilibus glabris squamas lingulatas glabras triplo superantibus, stylo brevi, stigmatibus brevissimis integris; foliis oblongo-cuneatis vel obovatis apice argute dentatis ceterum integris breviter petiolatis utrinque concoloribus glaberrimis venis supra impressis.

Hab. In Sikkim, reg. alp., alt. 15,000–16,000 ped. (*J. D. Hooker*).

Fruticulus semipedalis vel minor, trunco pennam passerinam crasso ramoso atro-fusco; ramis arcuatis, ramulosis, flabellatim repentibus cum ramulis dense foliatis. Gemmæ glabræ rufescentes. Stipulæ nullæ conspicuæ. Folia $2\frac{1}{2}$ –3 lin. longa, $1\frac{1}{2}$ lin. lata, obovata v. oblongo-cuneata basi angustata apice acuta ibique serraturis 3–5 profundis subfissa, ceterum omnino integerrima, venis supra impressis subtus prominentibus rugulosa, petiolo perbrevis insidentia, læte viridia, subtus vix pallidiora, utrinque glaberrima pilis paucis ad basin petioli nonnunquam hirta. Amenta in ramulis ultimis terminalia, omnino sessilia et foliis summis obtecta, 2–5 flora. Am. mascula: rachis tenuissime puberula; squama lingulata, acutiuscula, vix lineam longa, testaceo-rufescens, glabra vel pilis brevissimis et rarissimis nonnunquam conspersa venisque obscurioribus lineata; filamenta gemina libera squamam duplo superantia eique concolora, glabra; antheræ etiam pallide brunnescentes, parvæ, globosæ. Amenta feminea vix 3 lineas longa, e floribus quasi umbellatim confertis 3–7 constantia; squama spathulato-lingulata, pallide fusca, glaberrima, venulosa, basin capsulæ superans; nectarium ovatum acutiusculum ventrem capsulæ attingens; capsula basi quasi in pedicellum brevissimum constricta, deinde incrassata et itaque ex ovata basi conica, $1\frac{1}{2}$ lin. longa, obtusiuscula, castanea, lucens, glaberrima; stylus vix $\frac{1}{4}$ lin. longus tenuis; stigmata eadem longitudine excurvata, quam capsula fusciora; lana seminum nivea.

A *S. Lindleyana*, quacum habitu maxime congruit, aperte differt foliis apice profunde serratis, planis. *S. retusam serpyllifoliam* non male habitu refert.

34. *S. SECTA*, *Hook. fil.* Amentis terminalibus eximie paucifloris foliis conditis, masc. diandris, squamis acutiusculis glaberrimis testaceo-rufescentibus; capsulis sessilibus glaberrimis squama rotundata ad medium involutis, stylo subnullo, stigmatibus brevissimis; foliis cuneatis apice 3–5-fidis glabris; fruticulus omnium minimus.

Hab. Sikkim, alt. 17,000 ped. reg. alp. (*J. D. Hooker*).

Est quantum novi omnium *Salicum* maxime pygmæa, e trunco hypogæo ramos vix pollicares undique divaricatos valde intricatos et dense foliatis, ut folia rosulata *Androsaces* vel *Drabæ* cujusdam, cæspites densos et minimos formans. Folia vix linea longiora, apice fere eadem latitudine ibique ad tertiam partem laminæ laciniis porrectis acutis secta, utrinque viridia, subcoriacea, plana, impresse venulosa.

Amenta terminalia foliis arcte abscondita, e floribus 2-4 constantia; mascula subrariflora, squamis apice subpallidioribus integris aut subdivisis filamentis geminis liberis pallidis et glabris duplo brevioribus, antheris rotundatis sat magnis, fuscioribus; feminea ovato-ovalia e capsulis 4-6 composita, in apice ramulorum capituliformi sessilia et foliis occultata; capsulæ lineam longæ, exacte conicæ, glaberrimæ, testaceo-rufescentes, dorso squama rotundata glaberrima apice infuscata involutæ, nectario capitato glabro ventrem capsulæ superante; stylus vix conspicuus; stigmata minima, divaricata.

S. oreophila et *S. secta* inter se eodem modo affines sunt ut *S. Brayi* et *S. berberifolia*; bene autem distinguuntur non tantum habitu toto fruticuli sed etiam foliis et amentis.

On *Leopoldinia Piassaba*, *Wallace*. By RICHARD SPRUCE, Esq.
Communicated by GEORGE BENTHAM, Esq., V.P.L.S.

[Read June 16th, 1859.]

As the palm producing the Piassaba of the Rio Negro—better known as that of Pará, from which port it is exported in vast quantities to Europe and N. America—has been supposed, for want of sufficient data, identical with the *Attalea funifera* of Martius, which furnishes the Piassaba of Bahia, I am desirous of laying before the Linnean Society a description of the former, which has been correctly referred by Mr. Wallace to the genus *Leopoldinia*. In proof of this assertion, I need cite only the most prominent characters: thus, in *L. Piassaba* Wallace, the male flowers have six monadelphous stamens, and the fruit is a berry with a sarcocarp composed of thick interlacing fibres, as in the *Leopoldiniæ* described by Martius; whereas in the genus *Attalea*, the male flowers have from ten to twenty-four free stamens; and the fruit is a drupe, with a stony putamen. The fruits of the Piassaba have the peculiar dull blood-colour, the compresso-globose form (though less compressed than in *L. minor*), and the gibbosity at the base (like that of the fruits of some *Sapindi*) which characterize all the species of *Leopoldinia* known to me*. The long beard of the petioles, extending to the very ground, except in the tallest specimens, where the lower part decays and falls away, and the crown

* The fruits of the *Leopoldinia* are called "flavo-virentes" by Martius, who, it is plain, had not seen them fully ripe.

of long widely-arched fronds, with the lower part of the rachis destitute of pinnæ for a length of nearly 5 feet, give to the Piassaba an aspect *sui generis*, and render it one of the most striking and handsome of the noble family of palms. This beard is the membrane which envelopes the frond in its folded-up state, and which in most palms falls away entirely when the frond expands, or remains attached in fragments to the margin and apex of the pinnæ. The other species of *Leopoldinia* have the stem "fibrillitio reticulato circumtextus"—sheathed with the persistent petiole-bases, which do not terminate in a pendulous beard, as in *L. Piassaba*. In tall specimens this net-work falls away, especially in *L. major*, Wallace*.

It is plain in all *Leopoldiniæ* that the sarcocarp of the fruit corresponds to the sheathing base of the petiole, as it consists of the same interlacing woody or horny fibres, only on a smaller scale and more compact. The sarcocarp of *L. Piassaba* differs from that of the other species of *Leopoldinia* in having several inner layers of slender brown interlaced fibres, which correspond to the beard of the petiole.

As Martius had not seen his *Leopoldiniæ* in all stages of their growth, the delicate fugacious spathes escaped his notice, and he describes the genus as spatheless, which would be an anomaly among palms. In reality, all the species have two very thin fusi-form brown spathes, which fall away at an early stage, long before the flowers are fully formed. I have good specimens of those of *L. minor*, Mart.

The ascertained distribution of the Piassaba palm is from the river Padauriri (a large tributary of the Rio Negro, entering on the left bank) on the south, to the cataracts of the Orinoco on the north; and from near the Japurá on the west, to the sources of the Pacimoni on the east. Its place of growth is in low sandy flats, where the water stands to a slight depth in rainy weather, but it avoids the swamps and the gapós in which the Mauritis and Euterpes delight. It is mostly found far away from the banks of the rivers; and I have seen but a single plant in such a locality, namely, just within the lower mouth of the Casiquiare,

* *L. major* is a many-stemmed palm—I have counted as many as twenty-four stems from one root; and by this character alone it may be distinguished from the other species of the genus, all of which have solitary stems. Seedling plants often form wide strips on the edge of sandy islands of the Rio Negro. In this state I have mistaken them, at a distance, for a species of *Pariana*—a genus of grasses well known to have considerable affinity to the palms.

on the right bank, on a barranca beyond the reach of floods. This was a noble specimen—perhaps over 40 feet high. My friend Wallace had been wrongly informed of the partiality of the Piassaba for black waters, as it grows more abundantly than anywhere else in the forests of the Casiquiare, and especially from the mouth of Lake Vasiva upwards, where the waters of the river are much whiter than below; but, as I have nowhere seen it on ground inundated by the rivers, it is plain that the colour of their waters cannot influence its existence. Near two Indian villages on this part of the Casiquiare, where I penetrated deep into the forest, I came on large groves of Piassaba. Nothing that I have seen in Amazonian forests dwells more strongly and pleasantly on my memory than my walk among these strange bearded columns, from whose apex sprang the green interlacing arches which shaded me overhead. The ground was dry—herbaceous vegetation there was none—and almost the only companions of the palm were scattered low trees of *Heterostemon simplicifolium* Spruce, with its large blue butterfly-like flowers, and another sort of tree of equally humble growth, clad with numerous flesh-coloured flowers, which Mr. Bentham is disposed to consider a new genus of *Flacourtiaceæ*. To have escaped from the cloud of mosquitos on the bank of the river no doubt enhanced the enjoyment. This was on the south side of the Casiquiare, but the Piassaba is equally abundant north of that river, and throughout the broad plain included by the Casiquiare, Orinoco, and Guainia. North of the Orinoco, on the Cunucunúma, Ventuári, and Sipápo, it is apparently much scarcer.

Of the Piassaba collected on the Casiquiare and Guainia, about half is taken down to Pará, and the other half to Angostura, on the Orinoco. In the summer season the Indian villages on those rivers present a very lively appearance, from the boat-building and rope-making which occupy their inhabitants. An interesting circumstance respecting the latter branch of industry came to my knowledge at San Carlos del Rio Negro, where, constantly hearing an old Indian woman spoken of as ‘La Inglesa,’ I sought her out, and found that she had been the lawful wife of an Englishman—a soldier in the Royalist army, who, when the Republican party triumphed, retired towards the frontier of Brazil, and squatted down at San Carlos. I was assured by his widow, and by others of the inhabitants, that this man, whom they knew only by the name of ‘Don Juan,’ first taught the people to make Piassaba-rope by the aid of a wheel, and in fact established the first rope-walk in

the Canton del Rio Negro. Whether this were true, or whether the Portuguese at an earlier date extended this branch of industry beyond the limits of their own territory, it is certain that, in so much as I have yet seen of the Peruvian and Quitenian Andes, rope of every kind, whether of Agave, Yucca, or palm fibre, or of cotton, is made purely by hand.

To Mr. Wallace's interesting account of the mode of collecting the Piassaba-fibre I have nothing to add, save that, as in the young plants, from which it is solely obtained, the beard is not always completely separated into fibres, but hangs down in riband-like strips, it is necessary before cutting it off to comb it out by means of a rude comb of two or three pointed sticks or long palm-prickles.

Besides the use which is made of the beard of the Piassaba, the pulpy envelope of the sarcocarp in the ripe fruit is said to yield the most delicious of all palm drinks, bearing great resemblance to cream both in colour and taste. I have not had the good fortune to taste it, or even to see the ripe fruit, which comes into season at midsummer, but, like the fruit of most other trees, is subject to seasons or periods of intermittence, when little or no fruit is matured. In 1853, the fruits all fell off when green. In the summer of 1854, I was prostrated by remittent fever at San Fernando de Atabapo. In the month of October of the same year I made an excursion of three days from San Carlos into the forest at the back of Solano, on the Casiquiare, with the express object of gathering flowers of the Piassaba, for which I was exactly in the season; but, singularly enough, on four trees I caused to be cut down there were only male flowers; and the heavy rain, with the sloppy state of the forest, compelled me to desist from further search. In the following November, a few days previous to my final departure from Venezuela, I visited another locality for the palm, on the Guainia, where I collected the fruit, which was almost fully formed externally, though the nucleus was still in a liquid state. In this place nearly all the Piassabas seen were monoicous. It seems, therefore, that the fruit takes from October to June (both inclusive), or nine months, to ripen. Some palms require a whole year, so that I have not seldom gathered ripe fruit and flowers on the same tree.

The other species of *Leopoldinia* have a thickish fleshy rind to the fruit, but it is so bitter as not to be eatable.

Another bearded palm is known to me, which has a consider-

able range of distribution in latitude, and apparently a very limited one in longitude, extending all along the eastern roots of the Andes, from a good way up the Huallaga, on the south, to the sources of the Bombonasa, and how much further northward I know not; but I have myself seen it through nearly six degrees of latitude. It is particularly abundant on low alluvial ridges strewn with pebbles of auriferous quartz near Paca-yacu, on the Bombonasa, and near Chapaja, on the Huallaga; but it nowhere descends into the Amazonian plain, nor have I seen it higher among the hills than about 2000 feet. This palm is a true *Attalea*, which I suppose distinct from *A. funifera* Mart., because the fruit is of a different form, and because Martius assigns a subaritime habitat to his palm. It is known to the inhabitants of Maynas by the name of '*Biróti-huási*' (*Biróti*, the darts used in shooting with the blowing-cane, and *huási*, a habitation), because they make their Biroti of strips of the petiole. The beard is deciduous—not persistent, as in the Piassaba—shorter, far less copious, and apparently less durable. It makes, however, excellent brooms, which is the only use I have seen it turned to. In the Quitoian Andes a very similar broom is made of the base of the petiole of the Cádi palm (*Phytelephas macrocarpa*); but the decayed parenchyma requires to be combed away from the fibres ere they can be well put to this use.

I proceed to give the dimensions of a Piassaba palm which I cut down in the forests of the Guainia, in November 1854; followed by a detailed description of the same species, drawn up from fresh specimens.

Caudex, 40 ft. Fronds, $15\frac{1}{2}$ – $16\frac{1}{2}$ ft. (including petiole of 4 ft. 8 inches). Pinnæ, 63 pairs. Beard, 21 inches long (but on young plants growing close by as much as 4 feet 9 inches long). Spadix, 4 ft.; stipes (to first branch), 15 inches, 10 lines broad, $4\frac{1}{2}$ lines thick; remains of two spathes, 5 inches apart. Fruit (not ripe), 21 lines long, 18 lines broad, 15 lines thick.

LEOPOLDINIA PIASSABA, *Wallace, Palm Trees of the Amazon*, p. 17.

Piaçaba Brasiliensium. *Chiquichiqui** Orinocensium.

Hab. Per tractus sylvarum Amazoniensium a fluvio Padaurí ad Orinoci

* The name '*Chiquichiqui*' originated on the Orinoco; but I am ignorant to what Indian language it belongs.

cataractas usque, in arenosis depressis quibus tempore pluvioso aquæ imbrium colliguntur, gregarie viget.

DESCR. *Caudex* solitarius, mediocris (15–40-pedalis), crassitudine eum *Iriartæ exorrhizæ* æquans, lævis, annulatus, barba petiolorum persistente omnino velatus, vel in stirpibus elatioribus, barba marcida delapsa, apice solo barbatus.

Frondes terminales, plurimæ contemporales, lato-arcuatæ, infimæ subpendulæ, pinnatæ. *Petiulus* elongatus, basi erectus concavo-convexus, margine in vaginam fibroso-reticulatam badiam demum in barbam pendulam dissolutam dilatatus, superne semiteres angulis acutis. *Pinnæ* sub 60-jugæ, horizontaliter patulæ apice subpendulæ, lineares acuminatæ.

Spadices 2 v. 3 contemporales monoici dioicive, arcuato-penduli, paniculati, 4-ies divisi, ambitu triangulari-acuminati, tomento pallido fulvo haud dense vestiti. *Stipes* a basi ad ramum infimum usque valde compressus et reliquiis spatharum duarum truncato-laceris instructus, superne polygonus. *Rami* angulares, basi plano-convexi, angulo recto v. subdivergente inserti; primarii sub 25, alterni, tres inferiores distichi prælongi 3-pinnati, superiores subito breviores polystichi; ramuli haud profunde foveolati, floriferi. *Bractææ* minutæ, ad ramorum basin triangulares acuminatæ, ad ramulorum basin subulatæ acuminatæ.

Flores ♂ ochrei, odore *Resedæ odoratæ* scatentes, vel ad spadicem totum ejusdem diversæve stirpis, vel ad spadicis ramos superiores solos, ramis infimis flores ♀ gerentibus. *Calyx* uterque 3-sepalus; *sepala exteriora* oblata fimbriata tenuiuscula pellucida late imbricata; *interiora* duplo longiora late ovata obtusa cartilaginea valvata. *Stamina* 6, filamentis basi ipsa coalitis et ovarii rudimento stylos 3 rudimentarios gerenti adnatis.—*Flores* ♀ haud vidi.

Bacca drupæformis subcompresso-globosa, basi subgibba, monosperma. *Epicarpium* sordide sanguineum nitidum. *Sarcocarpium* crassum laminis plurimis constans; lamina exterior e fibris crassis corneolignescens intertextis anastomosantibusque; laminis interioribus e fibris tenuibus intertextis. *Testa* tenuis membranacea badia separabilis. *Nucleus* in fructu juniore nondum formatus est.

Descriptions of some new species of *Musci* from New Zealand and other parts of the Southern Hemisphere, together with an enumeration of the species collected in Tasmania by William Archer, Esq.; arranged upon the plan proposed in the '*Musci Indiæ Orientalis*.' By WILLIAM MITTEN, Esq., A.L.S.

[Read March 17th, 1859.]

I. ANDREÆACEÆ.

1. ANDREÆA, *Ehrh.*

A. subulata, *Harvey*.

Hab. Tasmania; Jackey's Plain Creek, on rocks; rivulet at the back of Cumming's Head, Western Mountains. *Mr. Archer*.

A. nitida, *Hook. fil. et Wils.*

Hab. Tasmania; on stones; rivulet near Cumming's Head, Western Mountains. *Mr. Archer*.

A. petrophila, *Ehrh.*

Hab. Tasmania; the Falls. *Mr. Archer*.

A. ACUMINATA (*Mitten*). *A. acutifoliæ* simillima, foliis e basi erecta caulem amplectente patulis apicibus incurvis explanatis ovato-lanceolatis margine partis erectæ minute crenulata dorso apicem versus inconspicue papillosis, cellulis ex apice ad medium minutis quadrato-rotundatis diametro circiter $\frac{1}{4000}$ uncix metientibus deinde in oblongas subparallelogrammaticas parietes latitudine superantes inferne in longiores angustas fuscidulas parietibus crassioribus transeuntibus, perichætalibus ovalibus tenuiter acuminatis convolutis.

Hab. Tasmania; Cheshunt. *Mr. Archer*.

Very nearly allied to *A. acutifolia*, but with leaves a little wider, and cells in the upper portion smaller and more numerous, all with much narrower walls; those just below the middle of the leaf with walls narrower than their own width, and pellucid. From *A. petrophila* it recedes in the form of its leaves as well as in their cellular structure already described.

A. MONTANA (*Mitten*). *A. alpina* simillima, foliis parte superiore sensim acutis vix acuminatis margine integerrimis, margine partis inferioris minute crenulato, cellulis basi oblongis elongatisque parallelogrammaticis cito in minutas longitudine $\frac{1}{2000}$, latitudine $\frac{1}{4000}$ uncix metientes transeuntibus.

Hab. On rocks; rivulet behind Cumming's Head, Western Mountains; Tasmania. *Mr. Archer*.

Closely resembling *A. alpina* in size, habit, colour of its leaves, and general appearance; but the outline of its leaves, when compressed, is ovate, slightly acuminate; the cells at the base distinctly parallelo-

grammatic, and those of the upper portion larger. *A. acutifolia* has much narrower leaves.

A. ASPERULA (*Mitten*). Gracillima, cæspitosa, ramosa, foliis patentibus ovato-lanceolatis acutis enerviis margine superiore dorsoque papillis asperimis, cellulis superioribus longitudine $\frac{1}{3000}$ latitudine $\frac{1}{3000}$ unciae metientibus, inferioribus in folii medio croceis oblongis paululum majoribus.

Hab. Australian Alps, *D. F. Müller*, No. 14, *ex parte*. Readily distinguished from all the allied species by the very papillose margin and back of its leaves.

II. DICRANACEÆ.

1. PLEURIDIUM, *Brid.*

P. GRACILENTUM (*Mitten*). Monoicum, habitu *P. alternifolii*, gracile, foliis inferioribus e basi ovali subulato-lanceolato-acuminatis, nervo subulam superiorem totam occupante, margine ad basin partis subulatae indistincte crenulato vel lævi, cellulis inferioribus oblongis parallelogrammaticis superioribus minoribus, perichæcialibus thecam non tegentibus patulis anguste ellipticis subulato longe attenuatis canaliculatis apice parce denticulatis integerrimisve laxè areolatis, theca in pedunculo brevi subglobosa leptodermi, operculo brevissimo, calyptra cucullata ad thecæ mediam descendente.

Hab. West side of Tower Hill, Tasmania; *Mr. Archer*. Also in King George's Sound, New Holland, *Menzies*.

Excepting that the perichæcial leaves are less straight and bristly, in general appearance scarcely different from *P. alternifolium*, but its leaves are of a different form.

P. TENELLUM (*Mitten*). Monoicum, habitu staturaque *P. nitidi*, flore masculo gemmiformi minuto in foliorum caulinarum axillis, cellulis foliorum paululum brevioribus firmioribusque.

Hab. Tasmania, Cheshunt, *Mr. Archer*.

When dry, firmer than *P. nitidum*, with which it corresponds very closely, excepting in the male inflorescence, which has been observed on a single individual only. The substance of the leaves is firmer, and the whole plant pale brown. It appears to be distinct, but requires further examination in living specimens.

2. BRUCHIA, *Schw.*

(*Sporledera*, *Hampe*.)

B. MINUTA (*Mitten*). Monoica, perpusilla, brevicaulis, foliis patentibus lanceolatis angustatis, nervo percurrente, margine superne serrulato, cellulis laxiusculis, theca suborbiculari-ovata acuta collo sensim attenuato sessili erecta, calyptra apice rugulosa thecæ tertiam partem obtegente, flore masculo gemmiformi.

Hab. Tasmania, sides of ditches, Cheshunt, *Mr. Archer*.

Plants very minute, brownish, considerably smaller than *B. brevipes*. Leaves, when dry, appressed. In appearance, it resembles the smallest states of *Pleuridium nitidum*.

3. LEPTOTRICHUM, Hampe.

L. PRÆALTUM (Mitten). Dioicum, dense cæspitosum, robustum, caule elato subsimplici radiculis fuscis albidisve tomentoso, foliis patulis siccitate incurvis recurvisve subcrispatis e basi ovali sensim ad apicem angustatis lanceolatis concavis nervo lato sed tenui partem lanceolatam fere totam occupante, margine superne minute subserrulato, cellulis inferioribus oblongis ovoideis in rotundatas transeuntibus alaribus nullis, perichætialibus convolutis vaginatisque externis acuminate internis subito in acumen setaceum contractis, theca in pedunculo elongato flavo cylindrica erecta, operculo subulato æquilongo subrecto, peristomio parvo dentibus rubris dimidio superiore irregulari modo bi-trifidis annulo angusto, flore masculo parvo in caule gracillimo innovante e tomento in axillis foliorum plantæ fertilis oriente.

Hab. Magellan, in woods, Sandy Point, *Lechler*, 1022.

In size and appearance not unlike *Dicranum Drummondii*, B. & S., but in the structure of its leaves closely allied to those species of *Leptotrichum* in which the nerve occupies nearly the whole of the upper portion of the leaf.

L. AUSTRALE (Mitten). Monoicum! caule elongato ramoso cæspitoso, foliis erecto-patentibus elongato-ovalibus ellipticisve, cellulis elongatis areolatis, nervo in subulam setaceam apice parce denticulatam longe excurrente, perichætialibus elongatis convolutis apice abruptis nervo longo capillari excurrente, theca in pedunculo circiter semiunciali pallide fusco ovali erecta fusca, flore masculo in ramo ex inferiori parte caulis fertili egrediente terminali.—*Lophiodon strictus*, Hook. fil. et Wils. in Fl. Antaret. Crypt. p. 18. t. lix. f. 2. *Didymodon longifolius*, var. 3. *penicillatus*, eorund. l. c. p. 102. *D. longifolius* et *Distichium capillaceum* in Flora Novæ Zelandiæ enumerati etiam huic speciei pertinent.

Hab. Cheshunt, Tasmania, *Mr. Archer*; New Zealand, *Dr. Lyall*; Falkland, Lord Auckland's and Campbell's Islands, *Dr. J. D. Hooker*.

This most distinct moss has been wrongly described with dioicous inflorescence and striated leaves. In the specimens collected by Mr. Archer the stems are four inches high, but the seta is not longer than in the shorter states of the plant. The capsules in all the specimens are too old to afford an idea of the perfect peristome; but in every other particular the structure is similar to that observable in the species of *Leptotrichum*, and not at all different from that of *Weissia stricta*, Hook. fil. et Wils. Flora Antaret. Crypt. p. 98, t. clii. f. 4, which is also referable to the same genus.

L. HYALINUM (Mitten). Dioicum? caule elongato ramoso, foliis erecto-patentibus e basi elongata elliptica convoluta hyalino-marginata subulato-angustatis, nervo subulam superiorem totam occupante apice parce denticulato, cellulis inferioribus elongatis subparallelogrammaticis sensim superne in minutas rotundatas transeuntibus firmis, perichætialibus basi latiore longioreque vaginantibus, theca in pedunculo luteo-fusco ovali-cylindræcea.

Didymodon longifolius, var. 2. *tenuifolius*, Hook. fil. et Wils. Crypt. Antarct. p. 102.

Hab. On the ground on the hills, Hermite Island, Cape Horn, and in the Falkland Islands, *Dr. J. D. Hooker*.

In habit similar to *L. Hookeri*, C. Müll., but in the outline of its leaves more like *L. australe*; readily distinguished from both by the hyaline margins of its leaves. The male flower has not been seen.

L. OLDFIELDII (Mitten). Monoicum, habitu *L. affinis*, foliis e basi lata oblongo-ovata erecta longe subulatis patentibus apice parciissime denticulatis, cellulis angustis elongatis sensim superne brevioribus firmis nervo subulam superiorem totam occupante canaliculatis, perichætialibus basi longiore latioreque elliptica convolutis, theca in pedunculo elongato ætate rubro cylindræcea arcuata, flore masculo gemmiformi brevifolioso in foliorum caulinarum axillis.

Hab. In Tasmania, *Mr. Oldfield*, No. 154.

Very near to *L. affine*, C. Müll., in size and appearance, but with leaves about twice as wide at the oblong base, and thence subulate.

L. capillaceum (Distichium, B. & S.).

Hab. Tasmania, behind Cumming's Head, Western Mountains, with *Conostomum pusillum*, *Mr. Archer*.

L. FERRUGINEUM (Mitten). Dioicum, caulibus cæspitosis, radiculis ferrugineis dense intertextis, foliis e basi erecta ovali-oblonga sensim attenuatis patentibus integerrimis nervo percurrente cellulis basi utrinque ad margines pluribus oblongis quadratisque parallelogrammaticis superioribus inæqualibus perichætialibus conformibus, theca in pedunculo rubro erecta globoso-ovata, operculo conico rostrato, peristomio e dentibus latis rubris dicranoideis annulo latiusculo composito.

Hab. On the ground, plain behind Cumming's Head, Western Mountains, Tasmania, *Mr. Archer*.

Whole plant dull ferruginous-green. Stems from half an inch to one inch in height. In general appearance it has some resemblance to *L. Jamesoni* (*Dicranum*), Taylor; but it is smaller, compactly cæspitose, and interwoven with intensely ferruginous radicles. The seta is about three lines long, rather stout, pale red. The small subglobose erect capsule readily distinguishes it from all its allies.

4. TREMATODON, *Rich.*

T. FLEXIPES (*Mitten*). Dioicus? cæspitosus, caule erecto breviusculo, foliis erecto-patentibus lanceolato-subulatis integerrimis nervo lato totam fere folii partem superiorem occupante, perichæcialibus latis vaginantibus, theca in pedunculo brevi gracili flexuoso stramineo sub-erecta rufo-fusca collo pallidiori æquilongo, operculo curvirostrato, peristomio e dentibus rubris dicranoides annulo composito.

Hab. On the ground, plain behind Cumming's Head, Western Mountains, Tasmania, *Mr. Archer*.

Very nearly resembling *T. brevicollis*, but with leaves in which the nerve occupies the whole of the upper three-fourths, the seta flexuose, and the peristome with distinctly cleft teeth.

5. BLINDIA, *Br. & Sch.*

B. acuta, *B. & S.*, var. *curviseta*.

Hab. Tasmania, on stones, rivulet behind Cumming's Head, Western Mountains, *Mr. Archer*.

6. DICRANUM, *Hedw.*

* *Eudicranum*.

D. robustum, *Hook. fil. et Wils.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

D. pungens, *Hook. fil. et Wils.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

D. Billardieri, *Schw.*

Hab. Tasmania, on logs in creeks, *Mr. Archer*.

D. dicarpon, *Nees*.—*D. leucolomoides*, *C. Müll. in Bot. Zeit.* 1851, p. 549.

Hab. Tasmania, in many places, *Mr. Archer*; Wellington Falls, Mount Wellington, *Mossman*, No. 744.

Variable in appearance, but a most distinct species.

D. Menziesii, *Taylor*.—*D. brachypelma*, *C. Müll. in Bot. Zeit.* 1851, p. 550!

Hab. Tasmania, in creeks, *Mr. Archer*.

D. ANGUSTINERVE (*Mitten*). Dioicum, *D. Billardieri* simile, caulibus brevibus ramosis, foliis patentibus subsecundis e basi subovali elongata sensim angustatis, nervo angusto percurrente dorso marginibusque apicem versus serrulatis, cellulis elongatis angustis alaribus oblongis quadratisque flavide fuscis in massam quadratam utrinque dispositis, perichæcialibus convolutis internis vaginantibus subito in acumen

breve setiforme angustatis, theca in pedunculo breviusculo semiunciali arcuata inclinata basi strumosa, peristomio dentibus rubris dicranis.

Hab. Tasmania, on dead wood, *Mr. Archer* and others.

Nearly allied to *D. Billardieri*, but with somewhat the aspect of *D. reflexum*. It differs from *D. Billardieri* in the form of the wider portion of its leaves being more elongate, and the narrow upper part being shorter; the internal perichæatial leaves are also furnished with a bristle-like point, which seems wanting in *D. Billardieri*.

** *Campylopus*.

D. introflexum, *Hedw.*

Hab. Tasmania, on logs, and on the ground, Cheshunt, *Mr. Archer*.

D. TORQUATUM (*Mitten*). *D. pyriformi* omnibus partibus maxime simile sed foliis a parte inferiori magis gradatim subulatis et lamina altiore a nervo distinguenda, cellulis in parte laminæ superiori quadruplo minoribus, foliis perichæatialibus internis basi tenerioribus, pedunculo siccitate spiraliter torto.—*Campylopus pallidus*, ex parte Hook. fil. et Wils. Fl. New Zealand, xi. p. 68, t. 84. f. 3. *Dicranum flexuosum*, C. Müll. in adnot. ad Muscos Mossmanianos, Bot. Zeit. 1851, p. 551. *D. (Campylopus) torfaceum*, Mitten in Hook. Kew. Miscell. 1856, p. 257.

Hab. New Zealand, *Colenso*, *Sinclair*, *Mossman*; Tasmania, on decayed bogs, West-end Rivulet, Cheshunt, *Mr. Archer*; Victoria, Australia, *D. F. Müller*.

So very much does this species resemble *D. pyriforme* (*Campylopus*, *Schultz*), that it may readily be passed over as a state of that species, having the same soft appearance. The species referred to in the 'Flora of New Zealand' as the typical form gathered by Prof. Jameson in the Andes of Quito is a more robust species, with stiffer and less finely attenuated leaves, and a capsule rough at the base. *Dicranum nodosum*, Beauvais in Hb. Hooker, is a much larger moss, with leaves having a longer base, stouter nerve, and stiffer habit; it is in all probability synonymous with *Campylopus nivalis*, Brid. If *Campylopus* could be defined so as to distinguish it from *Dicranum*, there would be no necessity to alter the name of the present species; but it seems impossible to separate them in an extensive herbarium, notwithstanding the difference in the aspect of some of the species, and, there being a *Dicranum pallidum* from N. America previously published by Bruch and Schimper, an alteration has become unavoidable.

7. *DIDYMODON*, *Hedw.*

D. purpureus, *Hedw.* (*Ceratodon*, *Brid.*).

Hab. Tasmania, on rocks and stones, Western Mountains, *Mr. Archer*.

D. Tasmanicus (*Tridontium*, *Hook. fil.*).

Hab. Tasmania, fossiliferous limestone, Meander River, *Mr. Archer*.

D. papillatus, *Hook. fil. et Wils.*

Hab. Tasmania, the Hummocks, *Mr. Archer*.

D. cyathicarpus (*Zygodon*, *Mont.*).

Hab. Tasmania, Cheshunt, *Mr. Archer*.

This and the allied European species, *D. Lapponicus* and *D. Mougeotii*, referred to *Zygodon*, and more recently, by M. Schimper, proposed as distinct, under the name of *Amphidium*, scarcely differ from *Rhabdoweissia*, except in the absence of a peristome; and *Rhabdoweissia* itself is not generically separable from *Didymodon*.

8. HOLOMITRIUM, *Brid.*

H. cirrhatum (*Weissia*, *Hedw.*).

Hab. Tasmania, Cheshunt, *Mr. Archer*.

Like those specimens collected in Victoria, Australia, by Dr. F. Müller, but, except in being rather more slender, not different from European specimens.

III. LEUCOBRYACEÆ.

1. LEUCOBRYUM, *Hampe.*

L. candidum, *Dill.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

IV. TRICHOSTOMACEÆ.

1. ASTOMUM, *Hampe.*

A. cylindricum (*Phascum*, *Taylor*).

Hab. Tasmania, Cheshunt, *Mr. Archer*.

2. WEISSIA, *Hedw.*

W. controversa, *Hedw.*

Hab. Tasmania, Port Sorrell, Long Hill, and Cheshunt, *Mr. Archer*.

3. TORTULA, *Hedw.*

T. Australasiæ, *Hook. et Grev.*

Hab. Tasmania, west side of Cataract, Launceston, *Mr. Archer*.

T. torquata, *Taylor*.

Hab. Tasmania, Doublegate Park, *Mr. Archer*.

T. calycina, *Schw.*

Hab. Tasmania, Port Lovell, *Mr. Archer*.

T. KNIGHTII (*Mitten*). Monoica, habitu statura coloreque *T. Northianæ* simillima, foliis siccitate crispatis humidis patentibus e basi paululum latiore subovata lanceolatis apice acuminatis comalibus sensim ad apicem angustatis lanceolatis marginibus undulatis integerrimis nervo concolori excurrente mucronatis, cellulis basi hyalinis elongatis utrinque ad margines altius quam in medio adscendentibus subito in minutas viridas obscuras transeuntibus, perichætialibus longioribus paululo latioribus, theca in pedunculo rubro cylindrica, operculo subulato theca dimidio brevior, peristomio et flore masculo *T. Northianæ*.
Hab. New Zealand, *Colenso, Kerr, Knight*.

This is the *T. cæspitosa* var. of Hook. fil. et Wils. in Fl. New Zealand; but it is assuredly distinct from *T. Northiana*, Grev., in the much narrower leaves with undulated margins.

4. *ACAULON*, *Hampe*.

A. APICULATUM, *Hook. fil. et Wils. Fl. Nov. Zeland. par. ii. p. 58, t. 83. f. 1*, ubi calyptra sub fig. 5 delineata delenda est et capsulæ apiculus in figuris 3 et 4 calyptram veram repræsentat.

Var. turgidum foliis internis turgide concavis longioribus.

Hab. Tasmania, Cheshunt, *Mr. Archer*.

These specimens are so different at first sight from those from New Zealand, from the turgid, inflated state of the perichætial leaves, that, relying on the figure, they were considered distinct; but an examination of authentic specimens shows that the species has not been fairly illustrated. The capsule is globose, without any apiculus; and the apiculus observable in the figures above quoted represents, much too large, the minute calyptra. The calyptra figured more nearly represents one of the lower leaves than any other portion of the moss. The margins of the leaves are generally obtusely crenate at the apex.

5. *DESMATODON*, *Brid.*

D. nervosus, *Brid.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

6. *SYNTRICHIA*, *Brid.*

S. princeps (*Tortula, De Not.; Barbula Mülleri, B. & S.*).

Hab. Tasmania, on rocks and stones, the Hummocks, near Cleveland, and on rocks, Port Sorrell, *Mr. Archer*.

Divided by Mr. Wilson (*Fl. Tasmanica ined.*) into three species, distinguished from each other by the outline of the leaves; but the structure is the same in all, and the differences appear of the same importance as those observable in forms of *S. ruralis* and *S. lævipila*.

S. FUEGIANA (*Mitten*). Dioica, *S. principi* simillima sed minor, foliis erecto-patentibus siccitate appressis ambitu ovato-lingulatis apice obtusis nervo in pilum hyalinum flexuosum lævem excurrente, margine

plus minus recurvo integerrimo, cellulis superne minutissimis rotundatis obscuris e medio ad basin pallidioribus elongatis pellucidis, perichætalibus latioribus, theca in pedunculo elongato rubro cylindrica curvata, operculo subulato, peristomio elongato dimidio inferiore tubuloso.

Hab. Falkland Islands, on sand-hills in Uranie Bay, *Dr. J. D. Hooker*; Capo-Negro, Magellan, *Lechler*, 1088.

Rusty-green; nearly allied to *S. princeps* and to *S. ruralis*, but smaller; stems half an inch to one inch high, seta an inch long. Easily recognized by its ovate leaves.

7. STREPTOPOGON, *Wils.*

S. mnioides, *Mitten* (*Barbula*, *Schw.*).

Hab. Tasmania, on logs in copses, Falls-run, *Mr. Archer*; Chili, *Lechler*, 654.

The calyptra of this species resembles that of *S. erythrodonta*, to which it is very closely allied.

Another species of this genus is *S. marginatus* (*Schistidium*, *Hook. fil. et Wils. Crypt. Antarct.* t. 151. f. 6).

8. ENCALYPTA, *Schreb.*

E. AUSTRALIS (*Mitten*). Monoica, *E. vulgari* simillima, foliis inferioribus ligularibus comalibus sub-elliptico-spathulatis obtusiusculis nervo percurrente dorso apice parce denticulato scabrove margine ob papillarum prominentiam erosula, theca cylindrica lævi gymnostoma, operculo subulato sub-æquilongo, calyptra apice lævi.

Hab. Tasmania, near the Cataract, Launceston, and on the fossiliferous limestone near Cheshunt, *Mr. Archer*; New Zealand, *Colenso*, *Kerr*, *Knight*.

Differs from *E. vulgari* in the less rounded apices of its leaves and smooth point of the calyptra.

V. GRIMMIACEÆ.

1. GRIMMIA, *Ehrh.*

* *Schistidium*.

G. apocarpa, *Hedw.*

Hab. Tasmania, on the rocks, the Falls; on stones, the Hummocks; on rocks, Meander River, and Jackey's Plain Creek, *Mr. Archer*.

** *Eugrimmia*.

G. pulvinata, *Hook. et Tayl.*

Hab. Tasmania, Cheshunt, and *var. β. Africana*, on rocks, Port Sorrell, and elsewhere, *Mr. Archer*.

G. trichophylla, Grev.

Hab. Tasmania, Cheshunt, Mr. Archer.

G. leucophea, Grev.

Hab. Tasmania, on stones, the Hummocks, Mr. Archer.

*** *Rhacomitrium*.

G. Symphyodonta, C. Müller, *Synops.* i. p. 809.—*G. emersa*, *ejusd.*, *Bot. Zeit.* 1851, p. 562.

Hab. Tasmania, on rocks, 'The Falls,' Mr. Archer; Mount Wellington, Mossman, No. 743; elsewhere, Mr. Oldfield.

G. crispula (*Rhacomitrium*, Hook. *fil. et Wils. Crypt. Antarct.*).

Hab. Tasmania, on rocks and stones, rivulet south of Cumming's Head, Western Mountains, Mr. Archer.

2. GLYPHOMITRIUM, Brid.

G. acutifolium (*Ptychomitrium*, Hook. *fil. et Wils.*; *Flor. Tasman. ined.*).

Hab. Tasmania, on rocks, Port Sorrell, Mr. Archer.

G. serratum (Mitten). *G. polyphylo* minus, foliis patenti-recurvis e basi ovata lanceolatis sensim acutis margine apicem versus serrato inferne recurvo nervo percurrente, cellulis basi paucis elongatis mox in rotundatas inter se remotiusculas diametro circiter $\frac{1}{4000}$ unciae metientibus transeuntes, perichætialibus caulinis similibus, theca in pedunculo quadrilineari ovali-cylindrica, operculo subulato subæquilongo, peristomio dentibus longiusculis rubris asperulis profunde fissis basi geminatim approximatis, calyptra *G. crispatae*.

Hab. Tasmania, rocks north side of the Cataract, Launceston, Mr. Archer.

In size and habit so nearly resembling *G. acutifolium* as to be readily mistaken for it, but safely distinguished by the serrated leaves, which are shorter and less narrowed towards the apex than those of *G. polyphyllum*.

G. ADAMSONI (Mitten). *G. crispato* simile sed minus, foliis inferne paululum dilatatis lineari-lanceolatis acutis nervo percurrente integerimis, cellulis basi paucis oblongis parallelogrammaticis cito in parvas rotundatas distinctas diametro circiter $\frac{1}{3000}$ unciae metientes transeuntibus, perichætialibus nullis a caulinis difformibus, theca in pedunculo trilineari ovali, operculo subulato, peristomio dentibus brevibus cruribus plus minus discretis.

Hab. Australia; common on trap-rocks, Melbourne, Mr. Adamson, No. 60.

Smaller than *G. crispatum*, with leaves scarcely wider at the base than they are in the upper part, their cells all distinct, and the capsule shorter.

G. MÜLLERI (Mitten). Monoicum, habitu *G. crispatis*, foliis e basi lata subquadrata superne paululum dilatata vaginante annotatis patentibus lanceolatis apice obtusis acutatis subcucullatis nervo sub summo apice evanido carinatis margine integerrimo, cellulis basi ad mediam partis latioris oblongis parallelogrammaticis inde ad apicem parvis rotundatis approximatis obscuriusculis diametro circiter $\frac{1}{3000}$ unciae metientibus, perichætialibus tribus brevioribus ovatis acuminatis acutioribus, theca in pedunculo tri-quadri-lineari ovali ætate corrugata, operculo subulato subæquilongo, peristomio vetusto, et calyptra *G. crispatis*.

Hab. Australia, Victoria, Rocky Mountains, called the Glass-houses, Moreton Bay, and Brisbane River, *Dr. Ferd. Müller*.

Densely tufted stems about half an inch high, as thick as those of *G. polyphyllum*, with hard crisped foliage.

G. FERNANDESIANUM (Mitten). *G. crispatis* simile sed robustius, foliis e basi erectiuscula ovali patentibus lanceolatis acutis incurvis nervo crasso lato percurrente marginibus integerrimis, cellulis basi infima paucis oblongis parallelogrammaticis cito abbreviatis superioribus minutis rotundatis distinctis, diametro circiter $\frac{1}{3000}$ unciae metientibus, parietibus pellucidis, perichætialibus conformibus, theca in pedunculo trilineari parva ovali-cylindrica, operculo æquilongo subulato, calyptra apice subscabra.

Hab. Insula Juan Fernandez, *Bertero*, 1591; et *Cuming*, 1486.

More robust, but with the same habit and appearance as *G. crispatum*. The capsule is small for the size of the moss. The very thick broad nerve readily distinguishes this species from its allies.

VI. ORTHOTRICHACEÆ.

1. ZYGODON, *Hook. & Tayl.*

Z. Menziesii (Codonoblepharum, *Schw.*).

Hab. Tasmania, on trees in open ground, and in the forests, *Mr. Archer*.

Z. Reinwardti, *Schw.*

Hab. Tasmania, on trees, Stackhouse Falls, *Mr. Archer*.

Z. Brownii, *Schw.*

Hab. Tasmania, on logs and dead trees, copses and rivulets, Cheshunt, *Mr. Archer*.

Z. intermedius, *B. & S.*

Hab. Tasmania, Cheshunt, *Mr. Archer*; Mount Wellington, *Mossman*, No. 758 in part.

2. ORTHOTRICHUM, *Hedw.*

O. Tasmanicum, *Hook. & Wils.*

Hab. Tasmania, Falls Run, *Mr. Archer*.

3. ULOTA, *Brid.*

U. FULVELLA (*Mitten*). Monoica, caule procumbente ramis pluribus brevibus ramoso, foliis, madore, e basi late ovali erecta concava serie unico cellularum oblongarum parenchymaticarum hyalinarum marginata interioribus angustis elongatis luteis patentibus, siccitate subtortis non crispatis, longe angusto lanceolatis nervo sub apice evanido carinatis, margine lævi, cellulis rotundatis diametro $\frac{1}{3000}$ unciae metientibus, perichæcialibus a basi sensim lanceolatis caulinis paululum latioribus erectioribus, theca in pedunculo ea duplo longiore ovali plicata, collo sensim attenuato, peristomio dentibus 8 bigeminatis apicibus secedentibus, interno —?, calyptra ramentis æquilongis luteis.

—*Orthotrichum luteolum*, Hook. fil. et Wils. Crypt. Antarct. ex parte.

Hab. Hermite Island, Dr. J. D. Hooker.

Like *U. germana*, but rather larger, its leaves not crisped when dry, narrower, the structure of the base different.

U. LOBBIANA (*Mitten*). *U. carinata* habitu colore statura crispationeque foliorum simile, foliis angustioribus e basi erectiuscula suborbiculari seriebus pluribus cellularum hyalinarum quadratarum crasse limbatarum marginata interioribus angustis luteis angustatis longe lanceolatis patentibus nervo carinatis marginibus minute erosis, cellulis rotundatis approximatis diametro $\frac{1}{3000}$ unciae metientibus obscuriusculis minutissime papillosis, perichæcialibus caulinis duplo longioribus vaginula nuda, theca in pedunculo ea quadruplo longiore, calyptra ramentis stramineis eam superantibus dense vestita.

Hab. Patagonia and Chiloe, Mr. Lobb.

Differs from *U. carinata* in its narrower leaves, with the marginal hyaline cells shorter, thick-walled, and in the naked vaginula.

U. CARINATA (*Mitten*). Monoica, pulvinata, foliis siccitate crispatis madore e basi erectiuscula suborbiculari concava cellulis marginalibus oblongis parallelogrammaticis hyalinis in seriebus pluribus dispositis interioribus elongatis angustis luteis lanceolatis elongatis nervo sub apice evanido profunde carinatis margine minute crenulatis cellulis minutis depressis approximatis latitudine $\frac{1}{2000}$ longitudine $\frac{1}{4000}$ unciae metientibus minute papillosis obscuriusculis, perichæcialibus longioribus latioribus erectioribus vaginula pilosa, theca in pedunculo quadruplo longiore ovali plicata, operculo convexo brevi rostrato, calyptra lævi, peristomio dentibus 8 bigeminatis ciliis 8 capillaribus subæquilongis.

Hab. Chiloe, Mr. Lobb.

Rather larger than *U. fulvella*, leaves wider, with cells more densely placed, crisped in drying, base of the leaf shorter than in its allies, capsule without an attenuated neck.

U. MACROCALYCINA (*Mitten*). Monoica, caule repente, ramis brevibus erectis, foliis patentibus siccitate appressis strictis e basi lata obovata

erectiuscula concava seriebus cellularum hyalinarum oblongarum parenchymaticarum prosenchymaticarumque marginata interioribus angustis elongatis angustatis brevi-lanceolatis apice obtusiusculis nervo sub apice evanido carinatis integerrimis, cellulis remotiusculis depressis latitudine $\frac{1}{2800}$ longitudine $\frac{1}{8000}$ unciae metientibus lævibus, perichætialibus exsertis late-lanceolatis erectis obtusis laxè convolutis nervo medio evanido, theca in pedunculo eam duplo superante ovali plicata, operculo conico acuminato, peristomio dentibus 8 bigeminatis, ciliis angustis 8 brevioribus?, calyptra nuda fusca.

Hab. Straits of Magellan, on trunks of trees, Port Famine, *Dr. Lyall*.

Less than *U. Hutchinsiae*; the straight cauline and large wide obtuse perichætial leaves readily distinguish it from its allies.

U. EREMITENSIS (*Mitten*). Monoica, cæspitulosa, foliis siccitate vix inutatis patentibus e basi erectiuscula suborbiculari lata concava angustatis lineari-lanceolatis nervo sub apice evanido carinatis margine ad apicem baseos dilatato et inde recurvo minute crenulato cellulis ad baseos latera seriebus pluribus parallelogrammaticis hyalinis interioribus angustis cito in rotundatas diametro $\frac{1}{3000}$ unciae metientes trans-euntibus papillois, perichætialibus lanceolatis, theca in pedunculo triplo longiore ovali plicata basin versus lævi, peristomio dentibus 8 bigeminatis apicibus liberis ciliis 8 angustis capillaribus subæquilongis, calyptra glabra.

Orthotrichum luteolum, Hook. fil. et Wils. Crypt. Antarct. ex parte.

Hab. Hermite Island, Cape Horn, *Dr. J. D. Hooker*.

A little larger than *U. germana* (Mont.), and with the bases of its leaves a little longer, their cells in the upper part not depressed, the leaves themselves not crisped when dry, and the cilia of the internal peristome capillary.

U. GLABELLA. Monoica, subpulvinata, foliis siccitate appressis subtortis madore e basi erectiuscula suborbiculari concava cellulis marginalibus oblongis parallelogrammaticis hyalinis in seriebus pluribus dispositis interioribus elongatis angustis angustatis longe lanceolatis patentibus nervo sub apice evanido carinatis margine minute crenulato cellulis remotiusculis rotundatis diametro $\frac{1}{3000}$ unciae metientibus papillois, perichætialibus paululum latioribus, theca in pedunculo eam duplo superante ovali plicata, collo brevi, calyptra nuda apice rugosa.

Orthotrichum luteolum, var., Hook. fil. et Wils. Crypt. Antarct.

Hab. Hermite Island, Cape Horn, *Dr. J. D. Hooker*.

The leaves not crisped in drying and the glabrous calyptra distinguish this from its allies. In size it agrees with *U. germana*. No perfect peristomes have been seen.

U. FUEGIANA (*Mitten*). Monoica, caule procumbente ramoso cæspitulosus, foliis siccitate tortis madore e basi late obovata erectiuscula concava margine cellulis oblongis hyalinis parallelogrammaticis in seriebus pluribus marginata inde angustatis longe lanceolatis patentibus nervo

sub apice evanido carinatis, cellulis remotiusculis rotundatis diametro $\frac{1}{3000}$ unciae metientibus lævibus margine apicem versus eroso, perichætialibus erectioribus paululum latioribus vaginula nuda, theca in pedunculo ea duplo longiore ovali, collo sensim attenuato plicato, peristomio dentibus 8 bigeminatis plus minus fissis, ciliis —?, calyptra ramentis paucis brevibus appressis pilosa.

Orthotrichum luteolum, Hook. fil. et Wils. *Crypt. Antarct.* quoad iconem calyptræ. O. coarctatum, Hook. et Grev., huc pertinere videtur.

Hab. Hermite Island, Cape Horn, Dr. J. D. Hooker.

Very near to *U. fulvella* in habit, size, and in the torsion of its leaves; but the base of its leaves with many series of pellucid marginal cells, the margin towards the apex irregularly erose, and the calyptra with few appressed hairs.

U. DARWINII (Mitten). Pulvinata, foliis e basi ovali concava erectiuscula cellulis hyalinis oblongis in seriebus pluribus dispositis interioribus angustis luteis patentibus longe lanceolatis nervo carinatis marginibus minute erosis, cellulis rotundatis remotiusculis diametro $\frac{1}{3000}$ unciae metientibus sublævibus, perichætialibus longioribus erectioribus paululum latioribus vaginula pilosa, theca in pedunculo eam duplo superante ovali plicata collo sensim attenuato, operculo convexo brevi rostrato, calyptra ramentis brevibus pilosa, peristomio dentibus 8 bigeminatis ciliis 8 capillaribus paululum brevioribus.

Hab. Terra del Fuego, Mr. Darwin.

Resembles very closely *U. Fuegiana*, but with larger leaves, which have their cells more closely placed, and the vaginula pilose.

U. LUTEA (Mitten).. Monoica, dense pulvinata, fulvo-lutea, foliis siccitate crispatis madore patentibus e basi obovata concava erectiuscula lineari-lanceolatis nervo flavo sub apice evanido carinatis cellulis utrinque ad baseos ovatae latera circiter quadriseriatis oblongis parallelogrammaticis hyalinis interioribus angustissimis elongatis luteis superioribus rotundis diametro $\frac{1}{3000}$ unciae metientibus in seriebus 10–12 inter marginem et nervum in folii medio dispositis papillosis margine minute crenulato et ubi basis in partem superiorem angustatur recurvo, perichætialibus lanceolatis latioribus vaginula glabra, theca in pedunculo vix duplo longiore ovali cylindrica plicata collo elongato crassiusculo, operculo convexo brevi-rostrato, peristomio dentibus 8 bigeminatis ciliis 8 angustis tertio brevioribus, calyptra ramentis exstantibus elongatis pilosa.

Hab. Tasmania, on trees, rivulet behind Cumming's Head, Western Mountains, Mr. Archer; Mount Wellington, and in New Zealand, Wairoa River, Kaipara, Mossman.

Corresponding in size with *U. crispa*, but with leaves of a different form at the base, erose margins, and cells in the upper portion larger and further apart; the capsule is also thinner.

4. MACROMITRIUM, *Brid.*

M. microphyllum (*Hook.*).

Hab. Tasmania, on trees in creeks and damp woods, *Mr. Archer*.

M. PUSILLUM (*Mitten*). Dioicum? *M. microstomo* simillimum, foliis siccitate spiraliter tortis madore patentibus lineari-lanceolatis apice breviter apiculatis nervo fusco sub apice evanido carinatis integerrimis cellulis basi angustis elongatis superioribus rotundatis diametro circiter $\frac{1}{3000}$ unciae metientibus breviter papillosis distinctis, perichætialibus internis brevioribus ovatis acuminatis, theca in pedunculo circiter trilineari ovali plicata ore intensiore colorato, calyptra nuda.

Hab. On stones, Cataract Hill, Tasmania, *Mr. Archer*.

Leaves longer and narrower than those of *M. microstomum*, with cells far larger than those of the last-named species, having a diameter of $\frac{1}{5000}$ th of an inch.

M. LIGULARE (*Mitten*). Dioicum? *M. erosulo* simile, foliis siccitate tortis subcirrhatis linearibus ligulatis obtusis vel nervo excurrente brevissime apiculatis carinatisque cellulis inferne pro spatio brevi ovoideis cito in rotundatas approximatas papillosas obscuriusculas transeuntibus margine erosulo, perichætialibus brevioribus ovatis acutis, theca in pedunculo trilineari ovali circa os intensius colorata et plicata, operculo conico acuminato, calyptra nuda, peristomio simplici dentibus brevibus.

Hab. New Zealand, *Kerr*; Waikeki, *Dr. Sinclair*.

Smaller than *M. prorepens*; leaves more crisped, with cells at their bases of an oblong or ovoid form.

M. EROSULUM (*Mitten*). Dioicum? caule repente, ramis brevibus simplicibus ramulosive dense stratis, foliis siccitate compacte tortis incurvisque madore patentibus e basi subelliptica ligulatis obtusis nervo flavo-fusco excurrente breviter mucronatis carinatisque margine papillis prominentibus eroso, cellulis inferioribus elongatis angustis lævibus superioribus apicem versus obscuriusculis grosse papillosis, perichætialibus paululo latioribus acutis, theca in pedunculo circiter trilineari ovali fusca circa os intensius colorata et plicata, operculo subulato subæquilongo, peristomio simplici dentibus brevibus, calyptra ramentis appressis sparsis pilosa.

Hab. New Zealand, *Kerr*; near Wellington, *Stephenson*; Middle Island, *Bidwill*; Waikeki, *Milne*.

In habit, size, and colour similar to *M. prorepens*, but the bases of its leaves narrower, the upper portion longer, more obtuse, the cells larger and less obscure. *M. prorepens* is monoicous.

M. ARCHERI (*Mitten*). *M. hemitrichodi* simillimum, foliis siccitate tortis subcrispatis madore patentibus inferne ellipticis inde lanceolatis obtusiusculis nervo excurrente carinatis brevissime apiculatis

margine minutissime eroso cellulis basi pro spatio brevi elongatis mox in rotundatas transeuntibus papillosis apicem versus obscurioribus, perichæcialibus brevioribus duplo latoribus acutis, theca in pedunculo tri-quadrilineari elongato ovali sub ore intensius colorato plicata, peristomio nullo?, operculo subulato, calyptra nuda.

Hab. On trees, Cheshunt, Tasmania, *Mr. Archer*; on dead branches of trees, Kermadec Rivulet, *Mr. Oldfield*.

Fulvous; in size and general appearance scarcely different from *M. hemitrichodes*, to which at least in part belongs *M. amœnum*, Hornschuch, according to authentic specimens; but in the present, the leaves, although agreeing in form, have their cells more widely separated, rather larger, and not obscure, as in *M. hemitrichodes*, in which too the leaves are smoother.

M. ORTHOPHYLLUM (*Mitten*). Dioicum, *M. longirostri* habitu statura coloreque simile, foliis siccitate appressis strictis madore patentibus late lanceolatis breviter apiculatis nervo excurrente concolori carinatis margine integerrimo cellulis e basi ad medium elongatis angustis inde ad apicem ovoideis latitudine circiter $\frac{1}{4000}$ uncia metientibus, perichæcialibus longioribus latoribus erectis longiore apiculatis, theca in pedunculo circiter sex lineari ovali ore plicato, collo sensim attenuato, operculo subulato subæquilongo, peristomio simplici dentibus brevibus liberis, calyptra nuda.

Hab. New Zealand, *Kerr, Knight*.

Very distinct from all its congeners in the leaves being straight, and, except that they are appressed to the stem, unaltered in drying.

M. Mossmannianum (C. Müller, Bot. Zeit. 1851, p. 561) is identical with *M. gracile*, Hook.

VII. FUNARIACEÆ.

1. EPHEMERUM, *Hampe*.

E. cristatum (Phascum, *Hook. et Wils.*).

Hab. Tasmania, Cheshunt, *Mr. Archer*.

2. LEPTANGIUM, *Mont*.

L. repens (Anictangium, *Hook. Musc. Exot.*).

Hab. Tasmania, Port Sorrell, and north side of Cataract, Launceston, *Mr. Archer*.

This curious moss, which has no affinity with *Hedwigia* nor with *Erpodium*, seems to accord very nearly with Dr. Montagne's description of *L. Perrottetii* from Senegambia, and from the structure of its leaves appears to be more nearly allied to this family than to any other.

3. PHYSCOMITRIUM, *Brid*.

P. CONICUM (*Mitten*). *P. pyriformi* simile, foliisque conformibus serrulatis cellulis fere dimidio minoribus marginalibus intensius coloratis,

theca in pedunculo bilineari pyriformi, operculo depresso-conico umbonato.

Hab. Tasmania, Leith's Creek, *Mr. Archer*.

Less than the usual states of *P. pyriforme*, but very similar to it in appearance.

4. ENTOSTHODON, *Schw.*

E. laxus (*Physcomitrium*, *Hook. fil. et Wils.*).

Hab. Tasmania, on stones, rivulet near Cumming's Head, Western Mountains, *Mr. Archer*.

E. apophysatus (*Physcomitrium*, *Taylor*).

Hab. Tasmania, the Hummocks, *Mr. Archer*.

E. PRODUCTUS (*Mitten*). Monoicus, parvulus, humilis, foliis inferne ovatis in acumen lanceolatum angustatis integerrimis nervo sub apice evanido cellulis elongatis, theca in pedunculo bilineari parva ovali, operculo depresso-convexo umbonato, peristomio nullo?

Hab. Tasmania, behind Cumming's Head, Western Mountains, *Mr. Archer*.

A small species allied in the form of its leaves to *E. Mittenii*, *Dzy. et Molk.* The fruit too young to exhibit the peristome, if indeed that organ is present.

5. FUNARIA, *Schreb.*

F. radians (*Weissia*, *Hedw.*).

Hab. Tasmania, the Hummocks, Port Sorrell, bark near Cheshunt, and on rocks north side of Cataract, Launceston, *Mr. Archer*.

F. hygrometrica, *Dill.*

Hab. Tasmania, on stones of fossiliferous limestone, and on the chimney of a cottage, Cheshunt, *Mr. Archer*.

VIII. SPLACHNACEÆ.

1. SPLACHNUM, *L.*

(*Eremodon*, *Brid.*)

S. octoblepharum, *Hook.* (*Dissodon plagiopus*, *C. Müller*).

Hab. Tasmania, on cowdung, Sand Hill, on logs, Smith's Creek, *Mr. Archer*.

IX. BARTRAMIACEÆ.

1. BARTRAMIA, *Hedw.*

* *Eubartramia*.

B. Halleriana, *Hedw.* (*B. Mossmaniana*, *C. Müller*, *Bot. Zeit.* 1851, p. 552).

Hab. Tasmania, on rocks, Elliott Rivulet, rivulet behind Cumming's

Head, and in a rivulet north side of the Western Mountains, at an altitude of about 2000 feet, *Mr. Archer*.

Notwithstanding the observations of M. C. Müller, there appears to be no real difference between these and European specimens.

** *Vaginella*.

B. papillata, *Hook. fil. et Wils. in Fl. Nov. Zealand.* p. 89, t. 86. f. 4.
(*B. acerosa*, *Hampe, Plantæ Muellerianæ*!)

Hab. Tasmania, east side of Ovens Creek, *Mr. Archer*.

B. FRAGILIS (*Mitten*). Dioica? dense cæspitosa, caule erecto subsimplici, foliis densis fragillimis erecto-patentibus e basi appressa laxè vaginante oblonga superne paululum dilatata ibique tenuiter hyalino marginata laxè areolata subito subulato longe lanceolatis cellulis obscuris densis nervo percurrente margine dorsoque serrulatis, perichætalibus lanceolatis inconspicuis, theca in pedunculo breviusculo rubro globosa plicata erecta, operculo brevi conico, peristomio externo normali interno processibus brevissimis rudimentariis.

Hab. On rocks, rivulet behind Cumming's Head, Western Mountains, Tasmania, *Mr. Archer*; New Zealand, *Mr. Kerr*.

More densely and compactly cæspitose than *B. papillata*, *Hook. fil. et Wils.* The subulate portion of the leaf wider, less papillose, and not so obscure. The inflorescence appears to be dioicous. The leaves are so densely congested that the vaginant base is not erect, but only appressed to those above it, and the slightest touch suffices to detach them from the stem.

2. *PHILONOTIS*, *Brid.*

(*Conostomum*.)

P. pusilla. (*Conostomum*, *Hook. fil. et Wils. in Fl. Nov. Zeland.*)

Hab. Tasmania, on rocks, the Falls, rivulet behind Cumming's Head, Western Mountains, *Mr. Archer*.

P. australis. (*Conostomum*, *Swartz.*)

Hab. Tasmania, in the same localities as the preceding, but barren, *Mr. Archer*.

Bartramia (*Philonotis*) *curvirostra*, *Mitten*, collected in Victoria, Australia by Dr. F. Müller; belongs to the same section as the two foregoing species, but is much smaller.

(*Philonotis*.)

P. appressa. (*Bartramia*, *Hook. fil. et Wils. in Fl. Nov. Zeland.*)

Hab. Tasmania, on rocks, Elliott Rivulet, rivulet near Cumming's Head, Western Mountains, *Mr. Archer*.

P. VAGANS (*Mitten*). Dioica, caule elongato ramoso, foliis patentibus ovatis sensim acutis nervo angusto excurrente marginibus cellulis angustatis subcartilagineis limbatis apicem versus serratis cellulis

omnibus conformibus magnis pellucidis parietibus angustis, perichæ-
tialibus e basi latiore lanceolatis, theca in pedunculo elongato rubro
horizontali globoso-ovali plicata collo vix ullo, operculo breviter
conico, floribus masculis in ramis gracilioribus laxifoliis foliis peri-
gonialibus latis apice obtusiusculis cymbiformi-concavis superne cel-
lulis angustis areolatis.

Bryum vagans, Hook. fil. et Wils. *Crypt. Antart.*

Hab. Hermite Island, Dr. J. D. Hooker; Sandy Point, Magellan, and
Chili, Lechler, 3063.

This fine moss has been referred by M. C. Müller to *Meesia*; the
fertile state is named by M. Schimper, in Lechler's collection, *Philonotis*
dimorpha, Schimper, MSS.

3. BREUTELIA, B. & S.

B. affinis. (Bartramia, Hook.)

Hab. Tasmania, The Falls, Mr. Archer.

B. COMOSA (Mitten). Dioica, caule erecto ramis pluribus confertis co-
mosis inferne fusco-tomentoso, foliis e basi brevi erecta superne dila-
tata utrinque ad margines seriebus pluribus cellularum majorum
hyalinarum limbatis angustatis lanceolatis patentibus nervo excurrente
piliformi mucronatis plicatis margine serrulatis papillosis, perichæti-
alibus e basi sensim angustatis late lanceolatis, theca in pedunculo
elongato sesquiunciali ovali inclinata plicata, operculo conico, peri-
stomio normali.

Hab. New Zealand, Manikau Forest, N. Island, Col. Bolton. Bay of
Islands, Dr. Jolliffe. Gathered also by Dr. J. D. Hooker, Mr. Kerr,
and Mr. Knight. Tasmania, on rocks and earthy banks, East Creek,
and rivulet near Cumming's Head, Western Mountains, Mr. Archer.
Wellington Falls, Mount Wellington, Mossman, 744 in part.

Differs from *B. pendula* in the form of the base of its leaves and of
its capsule.

B. DUMOSA (Mitten). Dioica, caule erecto ramis confertis dumoso
inferne radicellis fuscis intertexto, foliis e basi erecta superne dilatata
caulem amplectente cellulis fere omnibus conformibus angustatis lan-
ceolatis patentibus divaricatis plicatis papillosis siccitate non mutatis
nervo tenui excurrente mucronatis margine serrulato, perichæti-
alibus ovatis acumine lanceolato, theca in pedunculo erecto breviusculo
rarius elongato oblonga nutante plicata, operculo brevi conico, peri-
stomio normali.—*Bartramia pendula*, Hook. fil. et Wils. in *Crypt.*
Antart. ex parte.

Hab. Hermite Island and Kerguelen's Land, Dr. J. D. Hooker. Chiloe,
Lobb. Chili, Lechler, 813 and 809 in part.

Differs from *B. pendula* in the clasping bases of its more divergent
leaves, without the band of enlarged cells on each side. In Mr. Lobb's
specimens the seta is an inch and a half long; in those collected by
Dr. Hooker it is about half an inch.

B. DIVARICATA (*Mitten*). Dioica, caule elongato inferne tomentoso subsimplici, foliis e basi brevi caulem amplexante cellulis hyalinis pluribus ad angulos marginum congestis divaricatis lanceolatis plicatis papillois margine serrulatis nervo tenui excurrente mucronatis siccitate subflaccidis, perichætialibus ovatis integerrimis nervo angustissimo, theca in pedunculo elongato horizontali oblongo-ovali collo pyriformi attenuato, operculo conico, peristomio normali.

Hab. New Zealand, *Colenso*, *Dr. J. D. Hooker*, *Knight*, *Lyall*, *Sinclair*; Tasmania, *Cheshunt*, *Mr. Archer*.

Resembles the larger states of *B. pendula*, but differs in its divaricated leaves, which have, when dry, a subflaccid appearance, a differently formed base, and the stems almost simple.

B. pendula, which has been much misunderstood, varies greatly in its size, being sometimes not larger than the usual states of *Philonotis fontana*, as in the original specimens gathered by *Menzies*, at others as large as *B. gigantea*, *Schwægrichen's* figure 161 having been taken from this state; but the capsule is not erect. The *Hypnum elongatum*, *Hook. fil. et Wils. in Crypt. Antart. t. 60*, is certainly of this genus, and may be a form of *B. pendula*. *Hypnum consimile*, *Hook. fil. et Wils. in Crypt. Antart. t. 60*, is also to be referred to *Breutelia*.

B. Sieberi, of which some specimens have been gathered by *Mr. Oldfield*, may be thus characterized:—

B. SIEBERI, *Hornsch. in Musc. Sieber. No. 12*. Dioica, caule procumbente suberectove ramulis brevibus fasciculatis ramoso innovante iterumque ramoso inferne dense radiculoso, foliis haud nitidis e basi brevi erectiuscula ad insertionem contracta patentibus lanceolatis estriatis nervo angusto in acumen setaceo-pungens excurrente marginibus serrulatis inferne recurvis cellulis omnibus elongatis angustis papillois, perichætialibus conformibus, theca in pedunculo rubro unciali apice flexura angusta pendula ovali plicata, operculo depresso conico, peristomio parvo normali? flore masculo foliis quadruplo latoribus late ovatis patulis nervo superne evanido.

Hab. Tasmania, Mount Wellington, *Dr. J. D. Hooker* and *Mr. Oldfield*; New Holland, *Sieber*.

Stems in all the Tasmanian specimens scarcely exceeding an inch in height; colour of the foliage yellowish-green, without gloss; leaves narrow; cells in the upper portion elongated, everywhere distinctly papillose; alary cells few, indistinct. In all the allied species the cells of the upper portion of the leaf are shortened.

B. PLICATA (*Mitten*). *B. divaricatae* simillima, foliis siccitate curvatis e basi erecta plicata divergentibus lanceolatis nervo percurrente marginibus arcte serrulatis cellulis basi angustis elongatis pellucidis utrinque ad latera seriebus pluribus hyalinis superioribus quadrato-

oblongis inde rotundatis densissime minutissimeque papillois subopacis.

Hab. Chili, *Lechler*, 809 in part.

In the curled dry foliage, this agrees with *B. divaricata*; but in the plicate base and minutely papillose subobscure areolation of the upper part of the leaf, it recedes from all the species yet known.

X. BRYACEÆ.

1. ORTHODONTIUM, *Schw.*

O. sulcatum, *Hook. fil. et Wils.*

Hab. Tasmania, on dead trees, West-end Rivulet, *Mr. Archer*.

2. MIELICHHOFERIA, *Hsch.*

M. Eckloni, *Hornsch.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

3. WEBERA, *Hedw.*

W. nutans, *Hedw.*

Hab. Tasmania, road-side, Splitters Hill, *Mr. Archer*.

4. BRYUM, *L.*

*B. cæspiticiu*m, *Hedw.*

Hab. Tasmania, Port Sorrell, *Mr. Archer*.

B. bimum, *Schreb.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

B. torquescens, *B. & S.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

B. Tasmanicum, *Hampe.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

B. Billardieri, *Schw.*

Hab. Tasmania, Cheshunt, *Mr. Archer*. Wellington Falls, *Mossman*.

B. truncorum, *Brid.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

B. dichotomum, *Hedw.* (*B. atropurpureum*, *Auct.*)

Hab. Tasmania, rocks, Port Sorrell, burnt ground, plains, &c., *Mr. Archer*.

B. crassum, *Hook. fil. et Wils.*

Hab. Tasmania, Saw Pit Hill, *Mr. Archer*.

B. levigatum, *Hook. fil. et Wils.*

Hab. Tasmania, Cheshunt, a few barren stems, *Mr. Archer*.

XI. HYPNACEÆ.

1. METEORIUM, *Brid.*

M. FULVUM (*Mitten*). Ramis gracilibus flexuosis, ramulis remotis attenuatis flexuosis pinnatis, foliis subnitentibus luteis ætate fulvis patentibus e basi lata cordata alis amplexantibus hastatis sensim tenuiter acuminatis marginibus hic illic undulatis basi ad alas serrulatis superne minutissime serrulatis apicem versus integerrimis nervo brevi infra medium in carinam parvam latiusculam ultra medium exaratam evanido ramulinis minus tenuiter acuminatis distinctius serrulatis cellulis elongatis fusiformibus angustissimis distinctis minutissime papillosis sublævibus.

Hab. Australia, Victoria, Tarwin, *Dr. F. Mueller.*

A slender species, allied to the Indian *M. aureum*, but with its leaves attenuated into longer points.

2. HYPNUM, *Dill.*

* *Brachythecium*, *Schimp.*

H. rutabulum, *L.*

Hab. Tasmania, on trees, Long Hill, *Mr. Archer.*

H. paradoxum, *Hook. fil. et Wils.*

Hab. Tasmania, Cheshunt, *Mr. Archer.*

H. campestre, *B. & S.*

Hab. Tasmania, near Woolmers, *Mr. Archer.*

H. aristatum, *Hook. fil. et Wils. Fl. Tasmanica ined.*

Hab. Tasmania, *Mr. Archer.* New Zealand, *Mr. Knight.*

In size resembling *H. Buchanani*, but in the form of its leaves allied to *H. Vaucheri* and to *H. piliferum*, and agreeing with them in the cell-structure of its leaves and rostrate operculum.

** *Rhynchostegium et Eurhynchium*, *Schimp.*

H. ASPERIPES (*Mitten*). Monoicum, caule procumbente, ramis pinnatis, foliis patentibus latissime ovatis acuminatis serrulatis nervo tenui medio evanido cellulis longitudine circiter $\frac{1}{4}$ latitudine $\frac{1}{30}$ unciae metientibus, perichæcialibus latis in acumen breve attenuatis, theca in pedunculo sub-unciali aspero oblongo-ovali horizontali, operculo longirostrato, peristomio normali.

Hab. Tasmania, Cheshunt, *Mr. Archer.*

More densely branched and with more acuminate leaves than *H. hians*, *Hedw.*, to which in size and general appearance it is nearly allied.

H. tenuifolium, *Hedw.*

Hab. Tasmania, on stones and logs, Tent's Creek, *Mr. Archer.*

This species appears to be frequent in Tasmania and New Zealand, some of the specimens from whence agree exactly with *Hedwig's* figure in the 'Species Muse.'

3. TRACHYLOMA, *Brid.** *Caulis simplex.*

T. subbasilaris. (Hypnum, *Hook. Musc. Exot.*)

Hab. Tasmania, *Mr. Archer.*

** *Caulis dendroideus.*

T. comosa. (Hypnum, *Schw.*)

Hab. Tasmania, on stones in rivulets, Cheshunt, *Mr. Archer.*

T. arcuata. (Hypnum, *Hedw.*; *H. spininervium*, *Hook. Musc. Exot.*)

Hab. Tasmania, on the ground, and on stones in the beds of rivulets, Cheshunt, *Mr. Archer.*

In this species the superior or dorsal series of leaves are smaller than those of the lateral series; but it does not follow that it is to be referred to *Rhacopilum*, as has been supposed by M. C. Müller; for in every other particular, excepting the furrowed capsule, the species of this group are remote from that genus. Bridel's genus *Trachyloma* is adopted in preference to the creation of a new one to include the species here enumerated and a few others, which, although they do not in all respects entirely agree with *T. planifolia*, yet offer no prominent character whereby they may be distinguished. The nerve which in the cauline leaves of *T. planifolia* is imperceptible, is distinct in the leaves of the ramuli, although very slender. *Trachyloma* therefore agrees in structure with *Hypnum*, but differs in habit, the branches arising from a creeping leafless (?) rhizoma.

T. ARCHERI (*Mitten*). Dioica, ramis erectis inferne simplicibus sparse foliosis superne ramulis patentibus distichis pulchre pinnatis plumbiformibus in frondem brevem subtriangularem dispositis, foliis bifarie compressis ovato-lanceolatis acutis nervo percurrente dorso apice denticulato marginibus simpliciter serratis cellulis longitudine circiter $\frac{3}{8}$ latitudine $\frac{1}{4}$ unciae metientibus dorso minute papilloso punctatis, seriebus foliorum in latere dorsali minoribus sed conformibus, perichæcialibus e basi late ovata tenui acuminatis erectis, theca in pedunculo vix unciali horizontali oblonga sulcata, operculo longicurvi-rostrato, peristomio normali.

Hab. Ovens Creek, Tasmania, *Mr. Archer.*

Two or three inches in height, pale yellowish green, shining. Nearly allied to *T. arcuata*; but its branches are more regularly disposed, forming a subtriangular frond, and readily distinguished by its minutely dotted leaves and short capsule.

T. KERRII (*Mitten*). *T. arcuatae* similis, stipite plus minus elongato, apice ramis brevibus pinnatis in frondem brevem subrotundatum dense confertis, foliis rameis homomorphis ovatis acutis nervo tenui excurrente dorso spinoso dentato mucronatis marginibus superne breviter simpliciterque spinoso dentato cellulis angustis elongatis basi flavis

alaribus nullis, perichætiis ad basin ramorum copiosis foliis erectis e basi ovata sensim lanceolatis attenuatis superne serrulatis nervo in exterioribus obsoleto in interioribus tenuissimo infra apicem evanido, theca in pedunculo sub-unciali ovali inæquali horizontali lævi, operculo conico rostro brevi, peristomio normali.

Hab. New Zealand, near Wellington, *Stephenson*. Waikeki, *Dr. Sinclair* and *Mr. Kerr*.

Habit, size, and colour of *T. arcuata*, but with more tufted branches, and leaves not of different forms, the capsule not more than half so long, and not furrowed.

4. STEREODON, *Brid.*

* *Cupressiformes.*

† *Operculum brevirostre.*

S. cupressiformis, *Brid.*, var. *Mossmani*. (*Hypnum Mossmanianum*, *C. Müller*, *Bot. Zeit.* 1851, p. 565.)

Hab. Tasmania, on trees and logs, *Mr. Archer*.

If this moss were, as described by *C. Müller*, truly monoicous, it might be safely distinguished from *S. cupressiformis*, but male flowers are not present in any of the specimens yet examined.

S. chrysogaster (*Hypnum*, *C. Müller*. *H. patale*, *Hook. fil. et Wils.*).

Hab. Tasmania, Cheshunt, on logs, *Mr. Archer*.

†† *Operculum longirostre.*

S. curviculatus. (*Hypnum*, *Hook. fil. et Wils.*)

Hab. Tasmania, Cheshunt, *Mr. Archer*.

S. cyparoides, *Brid.*

Hab. Tasmania, Cheshunt, on logs, frequent, *Mr. Archer*.

S. contiguus. (*Hypnum*, *Hook. fil. et Wils. Fl. Tasmanica.*)

Hab. Tasmania, on logs and upon the ground, *Mr. Archer* and *Mr. Oldfield*. New Zealand, *Dr. Sinclair*.

Allied to *S. microcarpus* (*Hypnum*, *C. Müller*) and to *S. brachycarpus* (*Hypnum*, *Hampe*), but with more spicular leaves of a different outline.

S. JOLLIFFII (*Mitten*). Monoicus, *S. Loxensi* habitu staturaque similis, ramis apicibus cuspidatis, foliis patentibus laxè imbricatis ovali-ellipticis acuminatis concavis obsolete binerviis enerviisve integerrimis vel apice subserrulatis cellulis angustis elongatis alaribus utrinque tribus majoribus hyalinis, perichæcialibus interioribus tribus erecto-patentibus caulinis conformibus, theca in pedunculo gracili parva ovali inclinata horizontalive, operculo rostro æquilongo, peristomio dentibus flavis processibus solidis ciliis in uno brevioris coalitis in membranam ad $\frac{2}{3}$ exsertis annulo simplici.

Hab. Tasmania, on stones and the earth, Western Creek, *Mr. Archer*. New Zealand, *Jolliffe*, *Sinclair*, *Kerr*.

Very much like *S. Loxensis* (Hypnum), Hook., but with a leaf of a different form.

** *Isothecium*.

S. cochlearifolius. (Hypnum, Schw.)

Hab. Tasmania, on rocks, Elliott Rivulet.

S. deflexus. (Hypnum, Wils. MSS. olim.)

Hab. Tasmania, on the ground, rivulet at Cheshunt, and on logs, Western Creek, Mr. Archer.

S. gracilis. (Isothecium, Hook. fl. et Wils.)

Hab. Tasmania, stones in rivulets, Jackey's Plain Creek, Mr. Archer.

S. ANGUSTATUS (Mitten). Dioicus? ramis inferne simplicibus foliis appressis superne in frondem planiusculam dendroideam dense bi-tripinnatam divisis, foliis patentibus subcompressis anguste ovali-ellipticis brevi-acuminatis acutis concavis lateralibus complicatis integerrimis breviter binervatis, ramulinis anguste ellipticis superne serrulatis, cellulis angustis omnibus conformibus, perichætialibus e basi ovata convoluta subulatis patentibus, theca in pedunculo brevi ovali horizontali, peristomio normali?

Hab. New Zealand, near Wellington, Stephenson; and elsewhere, Kerr, Lyall, Knight.

Stems one and a half to two inches in height; habit that of *S. (Isothecium) arbuscula* and *S. (I.) deflexus*, but smaller in all its parts; leaves more narrow. Only one perfect peristome has been seen, and this appears to be normal.

S. lagurus. (Leucodon, Hook. Musc. Exot.)

Hab. Tasmania, Cheshunt, Mr. Archer.

The peristome of this moss is simple by reason of the external teeth being obsolete.

S. mollis. (Leskea, Hedw.)

Hab. Tasmania, Cheshunt, Mr. Archer.

*** *Plagiothecium*, Schimp.

S. Donianus. (Hypnum Donianum, Smith.)

Hab. Tasmania, Cheshunt, Mr. Archer.

This species has been confounded with *S. denticulatus*, but in the substance of its leaves it differs.

**** *Cylindrothecium*.

S. auriculatus. (Hypnum, Mont.)

Hab. Tasmania, on logs, Western Creek, Mr. Archer.

***** *Achyrophyllum*.

Rami erecti, elongati, ramosi. *Folia* lata, nitentia, concava, paleiformia.

Theca plicata, operculo longi-rostrato. *Florescentia* dioica.

S. acicularis. (Hypnum, *Brid.*)

Hab. Tasmania, Cheshunt, *Mr. Archer*.

S. sciuroides. (Leskea, *Hook. Musc. Exot.*)

Hab. Tasmania, trees in creeks, *Mr. Archer*.

To this group, of which *S. acicularis* is the type, belong *S. densifolius* (Hypnum, *Brid.*), from Tristan d'Acunha and New Zealand, *S. ptychocarpon* (Hypnum, *Schw.*), *S. ericoides*, and *S. Lyallii*, Mitten (*Leucodon nitidus*, *Hook. fil. et Wils. in Fl. New Zealand*). All these agree in habit, ramification, the red colour of their stems, and thin, pale, chaff-like leaves and plicate capsules. *S. ericoides* and *S. sciuroides* in the *Fl.* of New Zealand are joined with *Neckera setosa*, *Hook. Musc. Exot.*, to form the genus *Cladomnion*; but the last-named species is in structure altogether different, and is in fact a *Spiridens*.

Achyrophyllum differs from *Hylocomium*, *Schimp.*, in its ramification not being pinnate, and its plicate capsules. From *Plagiothecium* it differs in its leaves not being obliquely inserted and its erect stems.

5. SAULOMA, *Hook. fil. et Wils.*

S. tenella, *eorund.*

Hab. Tasmania, on logs near Cheshunt, and on rocks, Jackey's Plain Creek, *Mr. Archer*.

XII. NECKERACEÆ.

1. NECKERA, *Hedw.*

* *Euneckera*.

N. hymenodonta, *C. Müller, Bot. Zeit.* 1851, p. 564.

Hab. Tasmania, rivulets and damp copses, on trunks and branches of trees, *Mr. Archer*.

** *Thamnium*.

N. RIVALIS (*Mitten*). Dioica, humilis, ramis arcuatis parce bipinnatis apice sæpe productis stoloniferis, foliis distichis patentibus spathulatis acutis nervo ultra medium evanido margine latere inferiore anguste incurvo superne serrulatis ramulinis ellipticis magis serrulatis, cellulis inferne elongatis superne ovoideis rotundatis parvis, perichæatialibus e basi lata ovata brevissime nervata subulatis longe attenuatis, theca in pedunculo elongato ovali horizontali, operculo subulato rostrato, peristomio interno ciliis binis appendiculatis inter processus perforatos dentium longitudine in membrana ad $\frac{2}{5}$ eorum longitudinis exserta.

Isothecium pumilum, *Hook. fil. et Wils. Fl. Tasm.* t. 175. f. 7.

Hab. Tasmania, on stones, copse by West End Rivulet, on rocks by rivulets and Stackhouse Falls, *Mr. Archer*.

Allied to *Omalia oblongifolia*, *Hook. fil. et Wils.*, but larger, less densely branched, leaves acute, and peristome more developed.

XIII. LESKEACEÆ.

1. HEDWIGIA, *Ehrh.*

H. ciliata, *Ehrh.* (*Pilotrichum*, *Cryphæa*, *Dichotomaria*, *microcyatheum*, *C. Müller*, *Bot. Zeit.* 1851, p. 564.)

Hab. Tasmania, on rocks, O'Farrell's Hill, *Mr. Archer*. Near Launceston, *Mossman*, No. 830.

There appears to be no appreciable difference between these and European specimens.

H. imberbis, *Spruce*.

Hab. Tasmania, Cheshunt, on rocks, *Mr. Archer*.

H. Humboldti, *Hook.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

2. CRYPHÆA, *Brid.*

C. TASMANICA (*Mitten*). Monoica, ramis elongatis inferne sæpe denu-
datis superne ramulis brevibus ut plurimum fertilibus dense approxi-
matis, foliis patentibus orbiculari-ovatis acutis nervo sub summo apice
evanido margine e medio ad apicem minutissime sed dense serrulato
nullibi recurvo cellulis minutis ovoideis ad basin angustis elongatis,
perichætialibus e basi ovali subulatis thecam ovatam longe superanti-
bus, operculo convexo acuto, peristomio interno processibus angustis
dentium longitudine in membrana brevissima annulo duplici.

Hab. Tasmania, on rocks, Jackey's Plain Creek, *Mr. Archer*.

More robust than *C. dilatata* or *C. Mülleri*, the margins of its leaves not recurved below, and the perichætial leaves more subulate, but of the same habit and colour.

C. CRENULATA (*Mitten*). Monoica, ramis pinnatis, foliis late-ovalibus
acutis obtusisve concavis nervo paulo ultra medium evanido margine
apice crenulato inferne recurvo cellulis minutis ovoideis basi elongatis,
perichætialibus convolutis thecam paululo superantibus acuminatis
apicibus erosis, theca ovali, operculo conico acuminato.

Hab. Victoria, Tarwin, *Dr. F. Mueller*, No. 107.

Habit of the branches more nearly that of *C. patens*, but closely allied to *C. dilatata*, and, like it, probably a riparial species; from this, however, it differs in the shorter nerve of the leaves, more robust habit, and more shortly acuminate perichætial leaves.

3. TRACHYPUS, *Schw.*

T. HORNSCHUCHII (*Mitten*). Caule repente, ramis longissimis pendulis
flexuosis subpinnatim ramosis, foliis e basi cordata caulem amplexante
marginibus minute crenulatis ovatis brevi-apiculatis integerrimis nervo
apicem versus evanescente carinatis bistriatis e cellulis minutissimis
subopacis margine pellucidioribus rotundatis areolatis, perichætialibus
ovato-lanceolatis, theca in pedunculo brevi basi paraphysibus longe

exsertis ovali, operculo subulato longi-rostrato peristomio *T. nigrescentis*.

Meteorium cuspidiferum, *Tayl. MSS.*; *Hook. fil. et Wils. in Fl. New Zealand*, p. 101. *Pilotrichum nigrescens*, *Hsch. in Musc. Sieber*.

Hab. Tasmania, Cheshunt, *Mr. Archer*. New Zealand, *Messrs. Knight, Kerr, Jupp, Stephenson, Colenso*, and *Dr. Lyall*. Found also in Australia, New Holland, *Sieber*, and the Pacific Islands.

The original *Neckera cuspidifera*, *Taylor, MSS.*, is an East Indian species, which, although very nearly resembling the present species, has its leaves narrowed from a subquadrate base, and the narrowed portion obtusely sharpened, forming a wide point; the whole plant is also much more rigid. The capsules resemble those of *T. nigrescens*, with which also the peristome, so far as has yet been observed, appears to correspond; but the form of the leaves is very different, and the whole moss generally more robust.

T. CERINUS (*Mitten*). *T. Hornschuchii* similis sed robustior, ramis ramulis copiosioribus pinnatis foliis ambitu ovatis basi cordatis alis amplexantibus serrulatis deinde sensim apicem versus angustatis apice brevi-acuminatis nervo sub apice evanido vix carinatis haud plicatis margine medio sinuato recurvo integerrimo cellulis ad marginem pallidioribus elongatis cæteris abbreviatis obscuris inferioribus pallidioribus.

Neckera cerina et *N. luteola*, *Taylor MSS. in Herb. Greville*. *Meteorium cuspidiferum*, ex parte, *Hook. fil. et Wils. in Fl. New Zealand*, p. 101.

Hab. Tasmania, on trees in creeks, *Mr. Archer*. Australia, *Mr. Bidwill* and *Dr. F. Mueller*. Also in New Zealand.

More robust than *T. Hornschuchii*, but with the same habit and pale-green or yellowish colour. The leaves have their nerve narrower and thinner, and the cells for several series at the margin are paler and elongated; by this particular, and the sinuation of the leaf about the middle, the species is easily distinguished from the preceding.

T. flexicaulis. (*Pilotrichum*, *Tayl. MSS.* *Meteorium flexicaule*, *Hook. fil. et Wils. in Fl. New Zealand*, p. 101. *Pilotrichum croceum*, *Hampe? in Linnæa*, 1852.)

Hab. Tasmania, *Mr. Archer*. Found also in New Zealand and in S. America on *Cinchona lancifolia*.

It is not possible to determine if *M. Hampe's* name belongs to this or to one of the other Tasmanian species, the description being insufficient.

4. *LESKEA*, *Hedw.*

L. hispida. (*Hypnum*, *Hook. fil. et Wils.*)

Hab. Tasmania, bank by a waterfall, fossiliferous limestone, Cheshunt, *Mr. Archer*.

L. UMBROSA (Mitten). Dioica, caule procumbente breviusculo vage ramoso, foliis patentibus subsecundis siccitate vix mutatis e basi paululum latiore subovata angustatis ligulari-lanceolatis apice acuminatis apiculo longiusculo nervo crassiusculo in apiculo evanido margine superne minute serrulato, cellulis minutis subobscuris diametro circiter $\frac{1}{4000}$ unciae metientibus, perichæcialibus e basi latissime ovata subulato-attenuatis nervo percurrente marginibus utrinque uni-bi-dentatis cæterum integerrimis, theca in pedunculo sub-semiunciali rubro ovali horizontali, peristomio normali.

Hab. New Zealand, *Kerr*.

Stems about one inch long, with a few irregular branches. At first sight it might readily be passed over as a small or young state of *L. hispida*, which it very nearly resembles in habit and colour, but its leaves are of a very different form.

L. FULVA (Mitten). *L. delicatulae* habitu statura colore ramificationeque simillima, foliis caulinis patenti-recurvis e basi late hastato-ovata acuminatis planiusculis tenuiter biplicatis nervo concolori excurrente margine hic illic crenulato vix serrulato basin versus recurvo, cellulis distinctis limitibus latiusculis rameis late cordatis acuminatis concavis subserrulatis ramulinis ovatis acutis laxe imbricatis serrulatis nervo sub apice evanido dorso breviter papillois, perichæcialibus erectis ovatis acumine lanceolato recurvo nervo tenui percurrente margine superne filis elongatis ciliato, theca in pedunculo elongato rubro cylindrica curvata inclinata, operculo subulato-rostrato, peristomio normali interno, ciliis tribus inter processus positus.

Hypnum furfurosum, *Hook. fil. et Wils. ex parte*.

Hab. New Zealand, *Col. Bolton, Kerr, Knight, Milne, Dr. F. Mueller*. Also in Tristan d'Acunha, *Milne*.

L. LÆVIUSCULA (Mitten). Dioica, *L. tamariscinae* simillima, caule foliolis brevibus dense vestito, foliis ejusdem latitudinis subæquilateri-triangularibus nervo crasso concolori in acumen angustum elongatum flexuosum excurrente marginibus inferne recurvis integerrimis cellulis minutis subobscuris læviusculis rameis basi ovatis acuminatis obtusiusculis concavis ramulinisque ovato-oblongis compressis obtusis obscuris subintegerrimis minutissime papillois sublævibus, perichæcialibus erectis pallidis ovato-lanceolatis in acumen elongatum flexuosum subserrulatum attenuatis margine apicem versus partis latioris ciliato, theca in pedunculo elongato rubro cylindrica arcuata horizontali, peristomio normali.

Hab. New Zealand, near Wellington, *Stephenson*. Milford Sound, *Dr. Lyall*; and elsewhere, *Kerr*. Forests, Wairoa River, Kaipara, *Mossman*, No. 742. Cheshunt, *Mr. Archer*.

Size, habit, and colour of *L. tamariscina*, but with leaves more nearly resembling those of *L. cymbifolia* (*Hypnum, Dzy. et Molk.*), having the nerve excurrent into a long flexuose slender point, and scarcely anywhere

serrulate or papillose. The cauline and rameal leaves with longer points, the margins of the former scarcely serrulate; and the ciliated perichætal leaves suffice to distinguish this from the *L. delicatula* of the Northern hemisphere.

L. hastata. (Hypnum, *C. Müller*.)

Hab. Tasmania, on stones by rivulets, Ovens Creek, and Cumming's Head, Western Mountains, *Mr. Archer*.

5. RHACOPILUM, *Brid.*

R. strumiferum, *C. Müller*, *Bot. Zeit.* 1851, p. 563. (*R. australe*, *Hook. fil. et Wils. in Fl. New Zealand.*)

Hab. Tasmania, Cheshunt, *Mr. Archer*.

R. cristatum, *Hook. fil. et Wils. in Fl. New Zealand.*

Hab. Tasmania, *Mr. Archer*.

R. LÆTUM (*Mitten*). Dioicum? *statura R. spectabile æmulans*, læte luteo-viride, foliis ventralibus elliptico-ovatis acutis basi paululum asymmetricis dorsalibus ovatis sensim acutis nervis concoloribus in mucrones setiformes excurrentibus marginibus minute subserrulatis, cellulis ovoideis rotundatisque intermixtis distinctis lævibus pellucidis, perichætalibus erectis ovatis acuminatis, paraphysibus brevibus inclusis, theca in pedunculo elongato trigono rubro cylindræa arcuata plicata subhorizontali ore obliquo basi strumuloso, operculo subulato-rostrato, peristomio normali?, calyptra parce pilosa.

Hab. New Zealand, *Mr. Kerr* and *Dr. Sinclair*.

Intermediate in size between *R. tomentosum* and *R. spectabile*, but approaching nearest to the latter; leaves thin and less rigid than in the other New Zealand species.

XIV. MNIACEÆ.

1. FISSIDENS, *Hedw.*

F. adiantoides, *Hedw.*

Hab. Tasmania, small island at the foot of Top Paddock, Woolmers, *Mr. Archer*. Sterile.

F. rigidulus, *Hook. fil. et Wils.*

Hab. Tasmania, Tent Rivulet, Cheshunt, on rocks, Stackhouse Falls, *Mr. Archer*.

F. tenellus, *Hook. fil. et Wils.*

Hab. Tasmania, Sandstone Hill, *Mr. Archer*.

F. Taylori, *C. Müller*. (*F. pygmæus*, *Taylor*.)

Hab. Tasmania, on the earth, in copses, forests, &c., Cheshunt, *Mr. Archer*.

F. pallidus, *Hook. fil. et Wils. Fl. New Zealand*, t. 83. f. 7.

Hab. Tasmania, Cataract Hill, *Mr. Archer*.

F. INTEGERRIMUS (Mitten). Dioicus? caule humili cæspitoso ramoso, foliis plurijugis in frondem linearem approximatis patentibus linearilanceolatis apice obtusiusculis nervo concolori sub apice evanido lamina vera apice ad medium producto inæquali uno latere rotundato dorsali basi sensim angustato, omnibus laminis immarginatis integerrimis cellulis diametro circiter $\frac{1}{3000}$ unciae metientibus limitibus crassiusculis, perichætialibus conformibus, theca in pedunculo brevi apicali crassiusculo suberecta brevi ovali, operculo subulato brevior.

Hab. Tasmania, Cheshunt, *Mr. Archer.*

Half an inch high. Seta scarcely two lines long. In general appearance nearly allied to *F. pallidus*, but its leaves are entire, the cells smaller with thicker walls, male flowers absent. In the few specimens yet seen, the plants are, above brownish yellow, below black.

2. MNIOPSIS, gen. nov.

Acrocarpica. Folia cellulis hexagonis areolata. Peristomium externum dentibus 16; internum processibus alternantibus e membrana exsertis. Calyptra mitriformis parva.

M. PLUMULA (Mitten). Dioica, gregaria, caulibus simplicibus erectis inferne foliis minutis remotis superne majoribus in caule fertili horizontaliter insertis patentibus ovatis comalibus perichætialibusve ligulatis obtusis, in caule sterili distichis verticalibus oblongo-ovatis acutis obtusisve patentibus decurrentibus omnibus integerrimis nervo sub apice evanido cellulis hexagonis limitibus crassiusculis, theca in pedunculo bilineari gracili ovali cylindrica æquali, operculo subulato recto, peristomio externo dentibus longissimis angustis rubris siccitate incurvis cirrhatisque, interno processibus ciliiformibus brevibus in membrana brevi exserta, flore masculo fœmineo similis in caulium apicibus parvo capituliformi, antheridiis minutis brevibus, paraphysibus nullis.

Hab. Tasmania, below the quarry, Ovens Creek.

Stems from one-fourth to half an inch high, dull green, considerably resembling some small species of *Fissidens*; its affinity is, however, to *Schistostega*, with which it agrees in the vertical insertion of the leaves of its barren stems, but recedes in the presence of a rather stout nerve and the regular hexagonal cells. In the structure of its peristome it approaches to *Aulacomnion*. The calyptra is smaller in proportion than that of *Tetraphis* or *Tetrodontium*.

3. LEPTOSTOMUM, *R. Brown.*

L. inclinans, *R. Brown.* (*L. flexipile*, *C. Müller, Bot. Zeit.* 1851, p. 547.)

Hab. Tasmania, Cheshunt, *Mr. Archer.*

4. AULACOMNION, *Schw.*

A. Gaudichaudi. (*Leptotheca*, *Schw.*)

Hab. Tasmania, on rocks, The Falls, and Sandstone Hill, *Mr. Archer*.
Wellington Falls, Mount Wellington, *Mossman*.

5. HYMENODON, *Hook. fil. et Wils.*

H. pilifer, eorund.

Hab. Tasmania, Cheshunt, *Mr. Archer*.

6. RHIZOGONIUM, *Brid.*

R. distichum, Brid. (*R. Mülleri, Hampe in Plantæ Muellerianæ!*)

Hab. Tasmania, on stones by rivulets, Smith's Creek, *Mr. Archer*.
Mount Wellington, *Mossman*.

R. Novæ-Hollandiæ, Brid.

Hab. Tasmania, on dead trees, Western Creeks and West-end Rivulet,
Mr. Archer. Mount Wellington, *Mossman*, No. 756.

R. Hookeri, C. Müller. (*R. Mossmanianum, ejusd. Bot. Zeit.* 1851,
p. 547.)

Hab. Tasmania, on rocks, Elliott Rivulet and elsewhere, *Mr. Archer*.

There appears to be no real difference between these two reputed species; the difference in aspect probably arises from locality. Other and larger specimens than *Mossman's* have been received from New Zealand.

R. spiniforme, Brid.

Hab. Tasmania, Cheshunt, *Mr. Archer*. Mount Wellington, *Mossman*,
No. 753 part.

7. DALTONIA, *Hook. et Tayl.*

D. NOVÆ-ZELANDIÆ (Mitten). Monoica, *D. splachnoidi* simillima, foliis elliptico-lanceolatis acuminatis, nervo sub apice evanido profunde carinatis alis convexis marginibus recurvis cellulis ovoideis basi paululum longioribus apice minoribus margine tenui inconspicuo, perichætialibus parvis ovatis, theca in pedunculo superne subscabro globoso-ovali inclinata, operculo subulato, calyptra lævi, fimbriis ad thecæ medium descendentibus.

Hab. New Zealand, ravines near Wellington, *Stephenson*.

Stems, in the very small quantity of this species yet seen, half an inch high; in other respects similar in appearance to *D. splachnoides*; but the upper part of the leaf wider, not gradually narrowed, but rather abruptly acuminate, with shortened cells and the margin recurved.

8. MNIADELPHUS, *C. Müller.*

M. microcarpus. (*Hookeria, Hook.*)

Hab. Tasmania, rivulets, Ovens Creek, Cheshunt, and Tent Creek,
Mr. Archer.

M. pulchellus. (*Hookeria, Hook. fil. et Wils.*)

Hab. Tasmania, on rocks, rivulet near Cumming's Head, Western Mountains, *Mr. Archer*.

M. crispulus. (*Hookeria, Hook. fil. et Wils.*)

Hab. Tasmania, rivulet behind the Sawpit, Smith's Creek, *Mr. Archer.*

9. PTERYGOPHYLLUM, *Brid.*

P. nigellum, Hook. fil. et Wils.

Hab. Tasmania, rocks in rivulets and creeks, *Mr. Archer.*

P. OBSCURUM (Mitten). Caule bi- tri-pollicari latitudine cum foliis fere trilineari parce ramoso, foliis disticho-compressis lateralibus patentibus late elliptico-spathulatis angulo apicali obtuso basi angustatis intermediis patentibus dimidio brevioribus subtrapezoideis obtusis duobus cauli parallelis mediis dorsalibus et ventralibus erectis appressis late obovatis apice rotundatis omnibus foliorum nervo ad medium brevi-furcato evanido marginibus superioribus crenulato-serratis cellulis partis superioris circiter $\frac{1}{800}$ unciae diametro metientibus.

Hab. Tasmania, Cheshunt, *Mr. Archer.*

Whole plant obscure blackish green. Allied to *P. denticulatum* and *P. nigellum*, but with its lateral leaves very much narrowed towards the base, and these, as well as the intermedial and medial, of a different form. The species of this genus, from neglect in the descriptions of the very different forms of their leaves in the several series, are hardly intelligible.

XV. HYPOPTERYGIACEÆ.

1. CYATHOPHORUM, *Brid.*

C. bulbosum. (*Anœctangium, Hedw.*)

Hab. Tasmania, Cheshunt, *Mr. Archer.*

2. HYPOPTERYGIUM, *Brid.*

H. Novæ-Zelandiæ, C. Müller, Bot. Zeit. 1851, p. 562. (*H. Smithianum, Hook. fil. et Wils. in Fl. New Zealand.*)

Hab. Tasmania, on living trees, Western Creek, and by rivulets, *Mr. Archer.*

H. Struthiopteris, Brid. (*Lopidium pallens, Hook. fil. et Wils. in Fl. New Zealand.*)

Hab. Tasmania, in creeks, *Mr. Archer.*

XVI. BUXBAUMIACEÆ.

1. BUXBAUMIA, *Hall.*

B. TASMANICA (Mitten). *B. indusiata* simillima, foliis parvis ciliatis, pedunculo nitido subscabro, theca suberecta ovata superficie superiore planiuscula immarginata inferiore convexa, operculo conico.

Hab. Tasmania, Cheshunt, *Mr. Archer.*

Closely resembling *B. indusiata*, but differing in its nearly smooth shining seta. Peristome apparently composed of smooth bladdery cells, scarcely free from the internal membrane. All the capsules yet seen, although fully formed, are too immature to show the perfectly developed peristome, or whether the external capsular wall rolls off as in *B. indusiata*.

XVII. POLYTRICHACEÆ.

1. ATRICHUM, Beauv.

A. ligulatum, Mitten.

Hab. Tasmania, Mr. Archer.

This is probably the *Catharinea Mülleri*, C. Müller et Hampe, but it has not yet been compared with their description.

2. PSILOPILUM, Brid.

P. crispulum, Hook. fil. et Wils. Fl. New Zealand, pl. 87. f. 3.

Hab. Tasmania, Western Mountains, Mr. Archer.

P. australe, Hook. fil. et Wils. l. c.

Hab. Tasmania, on stones and on the earth, rivulet behind Cumming's Head, Western Mountains, Mr. Archer.

3. POGONATUM, Brid.

P. alpinum, L.

Hab. Tasmania, The Falls, and rivulet behind Cumming's Head, Western Mountains, Mr. Archer.

4. POLYTRICHADELPHUS, C. Müller.

P. MAGELLANICUS (L., emend.). Caule subsimplici vel fastigiato ramossissimo, foliis siccitate appressis incurvis subsecundisve humidis e basi erecta convoluta subquadrata cellulis elongatis pellucidis superne in minutas incrassatas subito transeuntibus patentibus angustatis brevilinearilanceolatis apice crassiusculo acutis lamellis obtectis margine in parte lanceolata dentatis dorso sublævibus, perichætalibus caulinis similibus vaginula pilosa, theca in pedunculo elongato inclinata horizontalive ovata bi-angulato superne plano subconcavo inferne convexo, operculo subulato, calyptra apice setulosa basi nuda vel pilis paucis vestita (*Hedw. Sp. Musc.* t. 20. fig. 1. tantum!; *Hook. fil. et Wils. Crypt. Antarct.* pl. 59. t. 3).

Catharinea (Polytrichadelphus) innovans, C. Müller, *Bot. Zeit.* 1851, p. 548.

Hab. Tasmania, Cheshunt, Mr. Archer. Mount Wellington, Mossman, No. 752; intermixed with *Polytrichum juniperinum*. Found also in New Zealand, Fuegia, and Campbell's Island.

Great confusion exists amongst the species of this group, whose capsules are inclined, bi-angular, plane or concave above and convex below, like those of *Lyellia* and *Buxbaumia*. The figure in "*Hedwig Sp. Musc.*" fairly represents this moss, so far as relates to the entire plant; in the figure in "*Crypt. Antart.*" the capsules are not depicted with the two angles, and the outline of the leaf is not quite correct. M. C. Müller describes the capsule as "irregulariter 4-5 angulata," but Mossman's specimens are precisely like those from New Zealand and Fuegia. Bridel and Müller describe the perichætical leaves as cordate, but these appear to be not different in form from the cauline.

P. CROCEUS (Mitten). Habitu staturaque *P. Magellanici*, caule simpliciter foliis siccitate erectis appressis humidis e basi erecta convoluta oblongo-ovata inferne cellulis elongatis teneris pallidis superne in maculam obcordatam basin fere dimidiam occupante intense croceo tinctis inde subito in minutas depressas incrassatas pallide fuscas transeuntibus angustatis lanceolatis erecto-patentibus apice crassiusculo acutis lamellis obteectis margine superne dorsoque apice dentatis, perichæticalibus basi longiore tenerioreque convolutis parte angustata brevior vaginula filis fuscis emergentibus pilosa, theca in pedunculo elongato inclinata oblonga bi-angulata plano convexo, operculo rostrato, calyptra glabra.

Hab. Brazil, common on clayey banks, *Gardner*, no. 12.

Leaves, when dry, more erect and appressed, and gradually narrowed from an ovate base in which the saffron-coloured spot appears to be uniformly present.

P. HORRIDUS (Mitten). Habitu formis communibus *P. formosi*, caule simplici, foliis rigidis siccitate vix mutatis e basi subovata erecta, convoluta, cellulis elongatis angustis subpellucidis subito superne in parvas depressas transeuntibus angustatis divaricatis lanceolatis apice sensim angustatis acutis lamellis obteectis marginibus e basi partis angustatæ dentatis erectis dorso apice parce subindistincte dentato, perichæticalibus caulinis conformibus paululo angustioribus, theca in pedunculo elongato oblonga horizontali bi-angulata plano-convexa.

P. Magellanicum, *Hedw. Sp. Musc.* t. xx. fig. 2.

Hab. Hermite Island, Cape Horn, *Dr. J. D. Hooker*. Sandy Point, Magellan, *Lechler*, 1163. Falkland Islands, *Dr. J. D. Hooker* and *Lechler*, 97.

Young leaves glaucous green, the older and nearly the whole plants ferruginous, stiff, and scarcely at all altered by drying, gradually narrowed at the apex into a bristly point, not obtusish as in *P. Magellanicus*, nor so abruptly narrowed from the dilated base, but gradually narrowed from a base of a subovate form. *Hedwig's* fig. 2, *l. c.* excellently represents the leaves of this species; but the figure of the whole plant (fig. 1) is very different, and equally well depicts the species here understood as *P. Magellanicus*; and as both inhabit the same region, it may not be

improbable that the original specimens were intermixed. As to the remark in 'Fl. New Zealand' that *P. giganteum* and *P. longisetum* may be forms of *P. Magellanicum*, with equal justice might all the tetragonal capsuled *Polytricha* be referred to *P. commune*.

5. POLYTRICHUM, *L.*

P. juniperinum, *Hedw.*

Hab. Tasmania, Elliott Rivulet, *Mr. Archer*; and elsewhere, *Mossman*.

P. commune, *L.*

Hab. Tasmania, Cheshunt, *Mr. Archer*.

XVIII. SPHAGNACEÆ.

1. SPHAGNUM, *Dill.*

S. cymbifolium, *Dill.*

Hab. Tasmania, *Mr. Archer*.

S. NOVO-ZELANDICUM (*Mitten*). *S. cymbifolio* simile, caule strato unico cellularum inanarium corticato foliis obovatis lingulatis apice obtusis denticulatis marginatis basi brevi-calcaratis spatii basi paucis inanibus cæteris repletis, ramis cellulis corticalibus inanibus foliis ovatis acuminatis apice truncatis denticulatis e serie triplici cellularum marginatis spatii latiusculis fibrillis repletis poris singulis binis trinisve involucrantibus latissime ovalibus obtusis apice denticulatis structura rameis conformibus, theca *S. cymbifolii*.

Hab. New Zealand, *Kerr* and *Knight*.

Nearly allied to *S. cymbifolium*, and with some resemblance to *S. contortum*, but its branches not so curved, its leaves of a different form, all margined, spaces wider, and pores few in number.

S. CONFERTUM (*Mitten*). Habitu *S. compacti*, ramulis dense confertis breviusculis, caule cortice e serie cellularum triplici formato serie externo fibris repleto, foliis oblongis apice rotundatis suberosulis spatii intercellularibus superioribus fibris repletis inferioribus inanibus margine nullo, ramulis cortice cellulis inanibus foliis ovatis concavis obtusis apice truncatis denticulatis margine serie unico cellularum angustissimarum superne minutissime serrulato spatii latiusculis fibris spiris approximatis repletis, poris singulis.

Hab. Tasmania; Western Mountains, rivulet behind Cumming's Head, *Mr. Archer*.

Appearance and habit similar to *S. subsecundum*, but the cortical cells disposed in a triple series.

S. MOLLICULUM (*Mitten*). *S. plumoso* simile, caule cortice ex strato unico cellularum efformato, foliis sub-elliptico-ovalibus basi brevissime calcaratis apice rotundatis subtruncatis minute denticulatis spatii intercellularibus ut plurimum repletis margine e serie triplici cellularum angustissimarum composito, ramulis flaccidis cortice cellulis inanibus foliis ovatis acuminatis marginibus superne incurvis apice

cucullato-concavis rotundatis argute denticulatis marginibus ut in caulinis spatiis angustis elongatis spiris repletis, poris nullis.

Hab. Tasmania; Little Bridge's-head Creek, *Mr. Archer*.

Habit intermediate between *S. acutifolium* and *S. plumosum*, but approaching more nearly to the latter.

S. ANTARCTICUM (Mitten). *S. cymbifolium* simile, caule cortice e stratis tribus cellularum inanium tecto, foliis oblongis apice rotundatis, margine nullo, spatiis intercellularibus latiusculis ut plurimum fibris repletis, ramulis patentibus, cortice cellulis inanibus, foliis late sub-orbiculari-ovatis acuminatis inferne erectis superne patentibus apice truncatis denticulatis margine angusto ex unico serie cellularum composito spatiis latiusculis longitudine in folii medio latitudinem sextuplo superantibus fibris spiris approximatis repletis, poris parvis singulis-quinisve, ramulis pendulis, foliis appressis ovatis integerrimis spatiis quatuor, sex-poriferis.

S. compactum, var. *Hook. fil. et Wils. Crypt. Antarct.* p. 122.

Hab. Campbell's Island. *Dr. J. D. Hooker*.

Rather more rigid than *S. cymbifolium*, but closely resembling it in size and appearance, differing, however, in the empty cortical cells of the stems and the margined leaves of the ramuli. From *S. compactum* it differs in the triple series of the cortical cells as well as in the form of the leaves.

S. AUSTRALE (Mitten). *S. cymbifolium* simile, caule seriebus circiter quinque cellularum corticato, foliis brevi-oblongis obtusis margine apicis incurvo erosulo basi calcaratis immarginatis spatiis intercellularibus inanibus, ramulis copiosis patentibus-recurvis, cortice cellulis inanibus, foliis imbricatis ovatis apice latiusculis obtusis margine ex uno serie cellularum angustissimarum apicem versus remote minuteque serrulato, spatiis latis longitudine in folii medio latitudinem quadruplo superantibus fibris spiris approximatis repletis, poris parvis singulis-quinisve, ramulis pendulis, foliis appressis ovato-lanceolatis obtusis, spatiis majoribus, poris circiter quinque.

S. compactum var. *ovatum*, *Hook. fil. et Wils. Fl. Antarct.* p. 122.

Hab. The Snugg, Huon, *Mr. Oldfield*; and in Campbell's Island, *Dr. J. D. Hooker*.

Very similar to *S. cymbifolium* and to *S. antarcticum*, but in structure allied only to the latter, from which it recedes in the form of its branch leaves. *S. compactum* is immediately distinguished from these species by its cortex being composed of a single series of cells.

S. cymbifolioides, *C. Müller, Bot. Zeit.* 1851, p. 546.

Hab. Cheshunt, Tasmania, *Mr. Archer*.

The description above quoted, according to Mossman's specimens, is incorrect, for the cauline leaves have a margin of three rows of narrow cells. In this species the cortical cells are in a single stratum, and the leaves of the ramuli have the intercellular spaces with a pore between every turn of the spiral fibre.

Observations on the Growth and Time of Appearance of some of the Marine Algæ, &c. By J. COCKS, Esq., M.D., Honorary Member of the Dublin Natural History Society. Communicated by ROBERT HUDSON, Esq., F.R.S., F.L.S.

[Read March 3rd, 1859.]

IN the course of conversation, when I was favoured last autumn with a call from Dr. Hooker accompanied by Dr. Harvey, of Trinity College, Dublin, I made some remarks on the growth and time of appearance of several species of the marine Algæ, to which these gentlemen thought I ought to give publicity. I have therefore much pleasure in availing myself of the present opportunity to contribute some additional facts to the rather limited knowledge we at present possess of a branch of natural history which, for some years past, has excited an unusual degree of interest. And, upon the threshold of this paper, I will observe that whoever adventures upon this branch of natural history with a view to follow it out to its remote conclusions, must necessarily become a practical collector.

In the course of this occupation he will observe many interesting facts, connected with the varied objects to which his attention will be especially directed, and the elucidation of which will require close and philosophical consideration.

I trust I may, without presumption, lay claim to an opinion on the subject, derivable from an experience of fifteen years, during which period I have almost exclusively devoted my time and attention to its pursuit. I have not only carefully examined the vicinity of Plymouth, so rich in marine Algæ, but I have with equal attention extended my researches for several miles both to the eastward and westward of the same place.

In the year 1855 I commenced the publication of the 'Algarum Fasciculi;' and since that period my explorations of the harbour and the coasts have been continuously and carefully repeated, *over and over again*, because it became imperatively necessary that I should provide myself with at least 700 specimens, including ten different species of Algæ, every consecutive two months. In order to accomplish this, it became necessary that I should traverse and examine a large extent of the shores in the neighbourhood.

Whilst engaged in this laborious occupation, which nothing but zeal born of love for the pursuit could have enabled me to carry out at this advanced period of my life, my attention was forcibly drawn, not only to the growth, but also to the period of the

reappearance of many species of marine plants; I at length discovered that in this respect a very remarkable difference exists between these and land-plants.

For instance:—dating from the period when I first became a collector, I ascertained that many of the plants which I originally found growing in certain localities did not invariably reappear under the same circumstances; that is to say, they either disappeared altogether, or remained in abeyance during the lapse of a series of seasons; whilst, in contrast, I found the same plants growing in quite a new and different locality. I observed also that there were a few species which I never found growing but in the very spots where they were originally discovered; for instance, the "*Griffithsia secundiflora*," which was first found by my friend the Rev. Mr. Hore growing near Bovisand in 1846, where I have since been in the habit of taking it myself for many succeeding years, occurs, I believe, in no other place in Great Britain. I would also remark that, although I have visited this locality at all periods throughout the year, with the exception of three of the winter months, I have never yet found a single specimen of this plant in fruit; but I am nevertheless inclined to believe that, if specimens could be taken in December, January, and February, they would be found to be in a state of fructification. The impediments are, however, very great. The place in which it grows is difficult of approach, even at the most favourable times, and then only in a boat. Whenever the wind blows from the south-west, or when the sea is rough, it is entirely unapproachable; and besides, on reaching the spot, it is invariably found growing submerged to the depth of three or four feet at the lowest spring-tides.

In the years 1844 and 1845, I was fortunate in collecting some very large and beautiful plants of *Callithamnion roseum*—not an uncommon species. Since that period I have not succeeded in taking any so fine, and for the last three years I have not been able to secure a single good specimen. It is, however, rather remarkable that in the spring of last year (1858) a curious variety of this plant, which I had never before seen, made its appearance. It was found growing in singular abundance, and in several different localities; and although I examined many hundreds of specimens, I did not succeed in finding a single one in a state of fructification. In the year 1849 I found another species belonging to the same genus, viz. a remarkably slender variety of *Callithamnion pedicellatum*, growing in luxuriant abun-

dance near the ballast-pond at Torpoint, since which time this variety of the plant has entirely disappeared.

In the same year, the Rev. Mr. Hore and myself found several specimens of that very rare and curious plant, *Carpomitra Cabrerae*, washed up on the shores of Mount Edgecumbe. Singular to relate, an interval of sixteen years had elapsed, and not a single specimen, save these, had been taken since the solitary one that was found by Miss Ball on the south coast of Ireland; and as previously to that occurrence no other specimen had been taken, Dr. Harvey has remarked, in his 'Phycologia Britannica,' that "this interesting plant is not truly the growth of our own shores, but has been wafted hither, as other European productions sometimes are, by the influence of currents." This surmise, however, proved to be incorrect, as both Mr. Hore and myself, since our first meeting with this plant, have on various occasions found it washed up on the shore at Mount Edgecumbe, and also at Torpoint. In the autumn of the years 1856 and 1857, I succeeded in dredging some very fine specimens, growing in seven fathoms of water in Plymouth Sound.

In the month of October 1847, I picked up my first specimen of that very rare and interesting plant, *Stenogramme interrupta*, amongst rejectamenta on the shore of Bovisand, near Plymouth, — a plant which had never before been taken in Great Britain, or perhaps in Europe. In the year 1849, and at various periods since, many other specimens have been found washed up on the shore. Latterly, however, I have taken with the dredge fine specimens of this plant, all growing on stones in six or seven fathoms of water. Some years after my first discovery of the *Stenogramme*, it has been dredged by Mr. Isaac Carrol in Cork Harbour. Miss Gifford has also found specimens washed on shore near Minehead in Somersetshire; but those I have seen from that locality are much broader in the fronds than those taken at Plymouth.

Gigartina pistillata, also a rare species, had not been found in Great Britain since the year 1829, when in 1851 it was re-discovered by my friend Mr. Gilbert Sanders, of Dublin, growing at Whitsand Bay, near Plymouth. I have since, on various occasions, secured other specimens of this plant, and always in the same locality, but I do not think any of them were so fine as those which were taken by Mr. Sanders.

When out collecting with Dr. J. W. Budd, of Plymouth, in the month of June 1854, we found growing in an obscure place amongst the rocks in Firestone Bay, Plymouth, which was only

approachable by a boat, a good many specimens of *Chrysomenia rosea*,—a plant which had never before been taken in Devon or Cornwall, a few only having been gathered by Mrs. Hayden and Mrs. Gattey in the year 1850 at Filey, on the Yorkshire coast. In the year following the one in which Dr. Budd and myself took our specimens, we found others growing in the same place; but afterwards they entirely disappeared from that habitat, though many other specimens have subsequently been found in several different localities, and, amongst others, growing on the mooring-buoys in the Sound.

Again, in the years 1850 and 1851 a considerable number of specimens of that rather scarce plant, *Microcladia glandulosa*, were washed up with other rejectamenta upon the beach under the Plymouth citadel. These were all growing parasitically upon the fronds of *Nitophyllum laceratum* and *Rhodymenia laciniata*. Since that time no other specimens have been taken in this neighbourhood, although the above-named plants on which they grew are still found as abundantly as ever.

A still more singular occurrence remains to be noticed, viz. that of a single specimen being found of a species for which, from the first moment I became a collector until then, I had been diligently seeking, and which had also been carefully sought for, many years previously, by Mr. Hore, without success. I allude to *Codium Bursa*, a single plant of which I discovered growing on one of the mooring-buoys in Plymouth Harbour; and although at the same time and subsequently I have examined all the buoys in the Sound as well as in the harbour, I have never found another.

How then are the irregularities in reference to the time of appearance, as well as the disappearance of the plants I have before alluded to, to be explained? We know that the fructification of the marine Algæ takes place with regularity; that is, the tetraspores when arrived at maturity burst, and the spores are liberated, which are carried by currents to places where they attach themselves to some substance, and in due time vegetate and produce perfect plants, similar to those from which they originated. Such being the case, although many of the plants enumerated in this paper have disappeared from their accustomed localities, yet it appears very strange, and difficult to explain why, they have not been found growing in other places, or washed on shore with other rejectamenta.

These observations will, in part, tend to show, as I have before remarked, that the growth and periods of the appearance and re-

appearance of marine plants are not so uniformly ordered as in the instance of those plants that grow upon the land. They will also compel us to admit the uncertainties that at present surround our limited knowledge of the economy and growth of the marine Algæ.

I have now to record a circumstance referring to the growth of some of the coarser species of Algæ, such as the *Laminariæ* and *Fuci*, the result of my own observation, which, if I may be allowed to hazard an opinion, may partially account for the disappearance of many of the filamentous species from their original habitats.

For the last three or four years I have observed in various places on the shore a gradual advance towards low-water mark, of the common *Fucus serratus* and *F. vesiculosus*. On the other hand, I have also observed that the *Laminariæ*, whose growth is in deep water, have been encroaching on the shore, and are now to be found in much shallower depths. The growth of these plants from two opposite positions towards one common neutral ground has had the effect of leaving very little or no intermediate space for the growth of other Algæ, as it was in this space (namely, between the tidal limits) that a great many of the filamentous Algæ, as well as many other species, were usually found growing. To my own personal knowledge these facts are comparatively new; and I am not aware that a similar eccentricity of growth has been remarked by naturalists in other portions of the English coast.

I trust, however, the knowledge of these peculiarities will stimulate the zealous algologist to watch with greater care the economy and growth of marine plants; for it is only by a studious observation of them, and an industrious exploration of their habitats, that we can hope to establish an intimate acquaintance with this very interesting branch of natural history.

In conclusion, the votaries of algology must always, by reason of the force of circumstances, be divided into two classes; for all cannot live upon the sea-coast, nor can all pay periodical visits to it. To those who can do so may be offered the privilege of contributing to the species already known, by the discovery of something that is new. They will, by this means, not only add to the gratification of those who are less happily circumstanced, but will confer upon themselves the pleasure of acquiring fresh knowledge from a new page in the great volume of Creation.

Præcursores ad Floram Indicam.—Balsamineæ. By J. D. HOOKER, M.D., F.R.S., L.S. &c. and T. THOMSON, M.D., F.R.S., L.S. &c.

[Read June 16th, 1859.]

THIS Order, as is well known, attains its maximum development in India, and it there presents a vast assemblage of forms, all but one of which strictly belong to the genus *Impatiens*.

It is often the case that when a genus is in a striking degree local, its species are to a considerable extent well marked and easily defined: such, however, is not the case with *Impatiens*; for it would be difficult to indicate another genus in the vegetable kingdom, presenting amongst its species so many and such different modifications of structure, and of which the species are so universally and so excessively prone to vary.

We commenced the study of the genus several years ago, with nearly 100 species, fully 2000 good specimens, from all parts of India, and engravings or original coloured drawings, with analyses, of upwards of fifty. On surveying these materials for the first time, we were struck no less with the prominence of the natural groups into which most of the species appeared to arrange themselves, than with the marked contrasts in the form and colour of the floral organs of many of the species; and the accessibility and apparent feasibility of these characters were so obvious, that we congratulated ourselves on the prospect of making natural and well-defined groups of the majority of the species at any rate. A little further examination of these seemingly objective groups sufficed to dispel the illusion; and after three different earnest attempts to master the genus, at intervals of several years, and with the aid of many more specimens received since we commenced the task, we have now just risen from what must be for the present the final effort, with a feeling of great dissatisfaction with the results obtained, whether as to grouping or limiting the species.

There are only two obvious and well-limited divisions of *Impatiens*:—1. The *Scapigeræ*, with tuberous perennial rhizomes (apparent roots), from which all the leaves immediately spring, and long scapes with short terminal racemes of flowers; and 2. The *Caulescentes*. Were both these divisions comprehensive, the facility of recognizing them would have materially aided the systematic study of the species; but it is not so: the acaulescent consists of five (or perhaps but three good) species, and is so singularly confined in geographical area (the western peninsular

mountains and Ceylon), that practically it is of little aid in assisting either the student or the systematist.

The caulescent group presents a number of inosculating subdivisions, of which we have adopted six, founded primarily on the habit and foliation of the species. This has often obliged us to separate plants that are very closely related indeed, and even more often to refer species of more dubious affinity to one or other group in an arbitrary manner. As it is, we have chosen what we take to be the lesser evil, and only after vainly attempting to group the species better by various combinations of the following important structural peculiarities :—

1. The seeds, which are numerous or few, with the testa polished, granulate, reticulate, pustulate, or almost villous. These afford excellent characters, but often not available in herbarium specimens; and similar seeds sometimes occur in plants of very different habit and floral structure.

2. The capsules, short, broadly elliptic, acute at both ends; or narrow, terete, or club-shaped, also afford excellent characters.

3. The form of the two combined lateral petals (called by Edgeworth and by us *alæ*), which an inspection of the garden Balsam, and of the Indian species in a living state, shows to be extremely variable. In some these are long and pendulous, in others they project horizontally and laterally; the length of the posticous lobes of each ala varies extremely, and even in the same species (*I. leptoceras* and others), it may itself vary from almost undivided to manifestly three-lobed. In *I. tingers*, Edgw., one lobe is developed in æstivation within the spur.

4. The anticous petal (*vexillum*, Edgw.) may be erect or projecting, flat or arched, entire or bilobed, keeled, cristate, or even spurred down the mesial line of the back, the spur sometimes terminating in a clavate gland (*I. racemosa*, var. *polyceras*). Great variation of this dorsal appendage in one species is exemplified by many.

5. The posticous or spurred sepal, called by us *labellum* (by Edgeworth *galea*), undergoes very many modifications in the genus, from a broad slightly concave lamina (*I. scabrida*, *tuberculata*, &c.) to a funnel-shaped organ with a very long spur (*I. leptoceras* and many others), a cornucopia (*I. longicornu*), a blunt straight sac (*I. Walkeræ*, *Jerdoniæ*, &c.), or a sac with a longer or shorter spur. This sepal is the most deceptive of all as affording characters: in *I. longicornu* it varies from a mere cone to a broad deep sac with an abrupt spur; in some of the section *Oppositi-*

foliæ we suspect that it is spurred or muticous in the same species, though, in the present condition of synonymy, we have often been obliged to accept such modifications as of specific value. The spur itself may be straight or curved or spiral, ascending or descending (according to the position of the flower), attenuate or inflated, or clavate or saccate, being sometimes variable in these respects in the same species.

6. The lateral sepals may be two or four, the two posticous alone (those next the labellum) being invariably present and tolerably constant in form; the two anticus, first observed by Edgeworth, may be present or absent in the same species, and are often reduced to papillæ or glands. The apices of the sepals (as of the dorsal spur of the vexillum) are often glandular. The relative size of the sepals and petals offers too often a very fallacious character, depending primarily on conditions of flowering.

7. The form of the flower may be flat—that is, with the laminae of the vexillum, alæ, and even of the labellum, all in the same plane; or the whole flower may be concave, from the concavity and prominence of the vexillum and labellum especially, which (as in *I. macrophylla*) may greatly exceed the alæ, and, appearing to confine these, give them a vertical direction.

8. The colour of the flower is very variable in many of the species; yellow and purple are the prevailing colours, the former passing through ochreous, &c., into a dull red, and the latter through pink, &c., into white. In many, the flowers are spotted, the yellow with various shades of red or purple, and the purple with darker spots or blotches. In *I. racemosa* and its allies, the yellow and pale purple are mixed, and we find the same species with wholly yellow and with dirty purple flowers. For extreme variation of colour in one species, we would cite *I. longicornu* and *leptoceras*; for intensity of colour, *I. janthina* and *racemulosa*.

9. The inflorescence is always lateral, though apparently terminal in the *Scapigeræ* and in some of the *Racemosæ*. The peduncle is solitary in many, fascicled and axillary in most of the *Laterifloræ*. The peduncles are 1-flowered in some, 2- or many-flowered in others; solitary in some, and fascicled in others. The species with normally fascicled 1-flowered peduncles have sometimes the fascicles reduced to one peduncle; and the species with 2- or more-flowered fascicled peduncles present sometimes 1-flowered fascicled peduncles, or even solitary 1-flowered peduncles. This leads to great confusion and an inosculation of some species (or individuals) in all the groups with alternate leaves, which we have been

unable to avoid. The position of the bracts must in all cases be referred to in order to determine the real condition of the inflorescence, though not necessarily to find the place of the plant in our system; for we are obliged to place a species with two 1-flowered axillary peduncles, bracteate at the base, in a different section from another with a solitary 2-flowered peduncle, bracteate at the ramification, however closely allied they may be in every other respect. A more awkward fact still, is that both these modifications may occur in the same species, sometimes in the same specimen.

An equally perplexing combination of discordant characters is afforded by the ramification of the peduncle itself, the inflorescence being racemose, interruptedly so, whorled and corymbose, or even umbellate through the reduction of the racemose or verticillate inflorescence. Numerous examples of several of these modifications in one species, or even specimen, may be found in the groups *Subverticillatæ*, *Umbellatæ*, and *Racemosæ*.

10. The foliation may be wholly basal (radical), as in the *Scapigeræ*; wholly opposite, as in most of the *Oppositifoliæ*; wholly alternate, as in most of the *Racemosæ*; wholly (or almost) verticillate or ternate, as in *I. Griffithii* and *I. Gardneriana*; opposite below and alternate above, as in *I. amplexicaulis*, *I. latifolia*, and *I. Thomsoni*; opposite below and ternately verticillate above, as in *I. flavida*; verticillate in the middle and opposite or alternate above and below, as in *I. trilobata*, *I. salicifolia*, and sometimes in *I. latifolia*. *I. multiflora* and *I. trilobata* are very puzzling species, being sometimes opposite-leaved throughout the whole individual, at others as constantly alternate, and others having some of the leaves ternate. The base (in form—acute, rounded, or cordate) and petiolation of the leaf are extremely variable in individual species; of the former we may instance *I. repens* and *I. scapiflora*; of the latter, *I. insignis*, *I. leptoceras*, and many others.

For the most part the foliage is glabrous; it is sparsely hairy in a good many, pubescent in a few, tomentose or hirsute in still fewer, villous or glandular on the surface in none. The margin is often serrate or duplicate-serrate, with gland-tipped lobules, and is armed at the base and on the petiole with stipitate glands, which are always very variable in number, position, and form in each species. No species has stipules properly so called; but many have large glands, solitary or fascicled, sessile or stipitate, at the bases of the petioles on the stem.

11. The stems of Balsams are annual or perennial; or more often

they have perennial rhizomes and annual branches; a few are suffruticose, having woody stems and annual branches. The axis presents numerous modifications of habit, consistence, surface, and extension. Some of the largest suffruticose species (*I. Jurpia*, *fruticosa*, &c.) attain 5 feet in height—and perhaps much more—resembling acanthaceous bushes in their half-shrubby character and tumid nodes; the scapigerous section has been already mentioned; another equally remarkable set of species, as regards their stems, includes the succulent-jointed epiphytic peninsular species, *I. Jerdoniæ*, *viridiflora*, &c.

The morphology of the flower of *Impatiens* has occupied the attention of many observers, who have taken different views of the real nature of the pieces of the perianth; we coincide with the view taken by Roeper*, Edgeworth†, and Henfrey‡, and which we have ourselves confirmed from numerous observations on the living species. There are three independent methods of obtaining proof of this view; and they all appear to us to give the same result: they are the following:—

1. Seeking amongst the species for those with the fullest complement of organs, and ascertaining the position and value of the supernumerary ones.—The existence of species with four lateral sepals was first indicated by Edgeworth, who has pointed out that they are figured in the plate of *I. glanduligera* (*I. Roylei*, Walp.) in Royle's 'Illustrations,' who, moreover, detected them in other species, *I. amplexicaulis*, &c., and first discerned their significance. We may add *I. longipes*, *urticifolia*, *leptoceras*, var. η , *sulcata*, *sabrida*, and *arguta* as also having four sepals, but not constantly.

2. Comparison with a closely allied genus which presents a different modification of perianth,—as *Hydroceras*, which at once explains *Impatiens*.

3. Examination of the relative positions, &c., of the parts in single and double flowers, with one another and with the axis—the course pursued by Mr. Henfrey.

All these methods lead to the same result, and appear to us to prove that the flower of *Impatiens* consists of a calyx of three (or more rarely five) sepals, of which the two supernumerary are always smallest and next the axis; the two next always green, and small as compared with the petals and the odd one, or that away from the axis, which is usually coloured and spurred. The corolla consists of one erect, often bifid or emarginate petal next the axis,

* Linnæa, ix. 921.

† Linn. Trans. xx. 37.

‡ Linn. Journ. Bot.

and four others combined in pairs and irregular in form. To save verbiage and periphrasis, we have, in the descriptions, called the two small lateral sepals only the "sepals;" the spurred one we call "labellum," the petal next the axis "vexillum," and the combined lateral petals "alæ."

The geographical distribution of the Balsams is on the whole singularly circumscribed: with the exception of the very few Siberian and European species, none extend to the north or north-west much beyond Kashmir; one only is found in Affghanistan (*I. Lemanni*). The species gradually increase in number, proceeding south-eastwards from Kashmir to Khasia and the peninsula of India, in about the following proportion:—

Kashmir, Kishtwar, and countries west of Sutlej ...	10
Sutlej to Nepal frontier	13
Nepal, Sikkim, and Bhotan	25
Khasia Mountains.....	21
Malay peninsula	8
Western peninsula	41
Ceylon	18

Only three of the Indian species are found in other parts of the world.

The distribution of the extra-Indian species is:—

Europe and Siberia	3
North America	2
Malay Islands, Philippines, and China	8 ?
Tropical Africa and Madagascar	8 ?
Extra-tropical South Africa.....	1

Numerous species will yet be detected in Madagascar and tropical Africa, and probably others in Western China and Birma. With regard to the distribution of the groups, the *Scapigeræ* are wholly peninsular and Ceylonese; the *Oppositifoliæ* almost exclusively peninsular, the *Umbellatæ*, &c., chiefly so; the *Laterifloræ* and *Racemosæ* chiefly Himalayan and Khasian.

Again, of these countries the western peninsula presents the most peculiar species, only one-eighth of its species being found in other countries. The Himalaya ranks next in this point of view, two-fifths of its species being found in other countries. The Khasia mountain species, on the other hand, are chiefly Himalayan, with a few peninsular, two-thirds of its species being found in other countries. One-half the Malayan species are found in the western peninsula, and two-ninths of the Ceylon.

We add a key to the species, arranged under their countries, but have little confidence in its proving a certain guide to determining them systematically,—our object in this, as with the other Præcursores, being to bring together all the available matter regarding each genus, rather than to present it in a completely elaborated systematic form*.

CONSPECTUS SECTIONUM.

A. SCAPIGERÆ. *Rhizoma* breve, perenne. *Folia* omnia radicalia. *Scapus* gracilis, apice racemifer.—(*Bracteæ* patentès pedicellis multo breviores, carnosulæ. *Pedicelli* graciles. *Sepala* latiuscula. *Labellum* saccatum v. calcaratum. *Alæ* 2–3-lobæ. *Vexillum* fornicatum. *Capsula* late elliptico-oblonga v. lanceolata. *Semina* pustulata, minima.) (Sp. 1–5.)

A perfectly natural group, and readily recognized, confined to the western peninsula and Ceylon.

B. OPPOSITIFOLIÆ. Annuæ. *Folia* omnia opposita v. in paucis alia opposita, alia ternatim verticillata. *Pedicelli* solitarii v. fasciculati, uniflores, rarissime (in *I. salicifolia*) 2-flores.—(*Sepala* angusta, labello plerisque concavo calcarato v. mutico, rarissime saccato. *Vexillum* sæpius breve. *Alæ* non caudatæ. *Capsula* brevis, medio turgida, utrinque attenuata, in *I. Kleinii* solum subcylindrica et *I. salicifolia* clavata. *Semina* magna, testa lævissima.) (Sp. 6–20.)

For the most part a very natural group. *I. salicifolia* is the chief exception, its 2-flowered states being referable to D. Many of the species are very doubtful, and the synonymy is confused, the original specimens being in many cases bad, or badly named in Herbaria. The *I. pendula* and *Mysorensis*, though alternate-leaved, should naturally come into this group; and single-flowered, opposite-leaved specimens of *leptopoda*?, *radicans*, and others of C may be referred to it.

C. SUBVERTICILLATÆ. *Folia* omnia subopposita, v. inferiora alternata, superiora opposita v. verticillata. *Pedunculi* 1–∞-flores. (Sp. 21–33.)

A very artificial group, divisible into those with one-, and those with two- or more-flowered peduncles. Occasional specimens of

* Whilst these pages were passing through the press, a Number of the 'Madras Journal of Science' (Sept. 1858) has been announced, containing an important paper by Lieut. Beddome on the Peninsular species, to which I shall refer at the end of this monograph.—J. D. H., Kew, Nov. 10th, 1859.

several having all the leaves opposite may be referred to B, and others with them all alternate to D, E, F, and G. There are great difficulties attending the discrimination of the allies of *I. latifolia*, *Roylei*, and *sulcata*. *I. Goughii* may be referred to *Umbellatæ* or *Laterifloræ*, or even to *Racemosæ*.

D. UNIFLORÆ. *Folia* omnia alterna. *Pedunculi* 1-flori. (Sp. 34-47.)

Another rather artificial assemblage, of which I suspect only a few (*I. Balsamina*, *scabriuscula*) have invariably 1-flowered peduncles, and of which the others, when 2-flowered, may be referred to E. *I. leptopoda* is probably a state of *I. latifolia*. *I. capillipes* is a curious species, very unlike the others.

E. LATERIFLORÆ. *Folia* omnia alterna, subdistantia, non omnia approximata v. subverticillata. *Pedunculi* solitarii v. fasciculati bracteolati, secus caulem elongatam plerumque axillares (non axillis supremis tantum siti), patentes, 2-6-flores. *Flores* racemosi, non umbellati. (Sp. 48-64.)

A very natural group, if confined to those species which, like *I. macrophylla*, *glandulifera*, *serrata*, *scabrida*, &c., have elongated stems and peduncles from axils of many of the rather distant leaves; but with regard to the others, several of them present specimens which fall naturally into G, and others when 1-flowered would be sought for in D. The group is divisible into several sections.

F. UMBELLATÆ et CAPITATÆ. *Folia* omnia alterna, versus apicem caulis conferta. *Flores* apices versus pedunculi elongati brevissime racemosi v. umbellati v. corymbosi.—(Bractææ plerisque conspicuæ.) (Sp. 65-78.)

This group embraces certain closely allied peninsular species with simple stems and very short, many-flowered inflorescence, of which *I. linearis* and *umbellata* are types; but others are branched and few-flowered, as *I. grandis*, *campanulata*, &c., and may be referred to E.

G. RACEMOSÆ. *Folia* omnia alterna. *Pedunculi* plures, elongati, multiflori, demum folio longiores. *Flores* racemosi, interdum verticillati, v. fasciculati. (Sp. 80-95.)

A very natural group on the whole, the principal exceptions being *I. longicornu* and *I. urticifolia*, some forms of which may be referred to E; *I. Walkeri* is closely allied to *I. Jerdoniæ*; *I. cornigera* to certain species in F.

CONSPECTUS SPECIERUM. (* denotat species non endemicas.)

I. MALAYANÆ.

- § B 1. **I. chinensis* (no. 6). *Fol.* oppos. subsessil. *Fl.* majusculi longe calcarati.
2. **I. oppositifolia* (no. 7). *Fol.* oppos. brevi-petiol. angusta. *Fl.* parvi breve calcarati.
3. *I. circæoides* (no. 32). *Fol.* oppos. longe petiolata. *Fl.* parvi breve calcarati.
4. *I. Griffithii* (no. 8). *Fol.* terna. *Fl.* majusc.
- § D 5. **I. Balsamina* (no. 34). *Fol.* angusta, grosse serrata. *Fl.* longe calcarati.
6. **I. flaccida* (no. 45). *Fol.* lata. *Fl.* longe calcarati.
7. *I. capillipes* (no. 49). *Fol.* angusta, crenata. *Fl.* brevi-calcarati.
- § F 8. *I. Tavoyana* (no. 79). *Fol.* petiolata, ovata. *Fl.* parvi.

II. CEYLON.

- § A 1. **I. acaulis* (no. 3).
- § B 2. **I. oppositifolia* (no. 7).
- § C 3. **I. latifolia*, *L.* (no. 20).
- § D 4. **I. Balsamina* (no. 34). Erecta. *Fol.* angust. *Fl.* longe calcarati.
5. *I. repens* (no. 38). Repens. *Fol.* long. pet. *Fl.* flavi brevi-calcar.
6. *I. leptopoda* (no. 39). Erecta. *Fol.* ampla. *Fl.* majuscul. pall. *Calc.* gracile.
7. *I. truncata* (no. 40). Erecta. *Fol.* membranacea. *Fl.* parvi. *Calc.* breve.
8. *I. Hensloviana* (no. 47). Erecta. *Fol.* ampl. pubesc. *Fl.* maximi albi. *Calc.* longiss.
9. *I. macrophylla* (no. 37). Erecta. *Fol.* maxima. *Fl.* medioc. fasciculati, alis exsertis. *Calc.* breve.
10. *I. glandulifera* (no. 36). Erecta. *Fol.* maxima. *Fl.* medioc. fasciculati, alis minimis inclusis. *Calc.* breve.
- § F 11. *I. janthina* (no. 66). *Fol.* 1-2. *Fl.* violacei.
12. *I. linearis* (no. 68). *Fol.* angust. *Fl.* pallidi. *Calc.* breviss.
13. *I. appendiculata* (no. 69). Simplex. *Fol.* ovato-lanc. *Fl.* pallid. *Calc.* breve.
14. *I. leucantha*, *Thw.* (no. 67). Simplex. *Fol.* lanceol. *Fl.* alb. *Calc.* conicum rectum.
15. *I. subcordata* (no. 71). Simplex. *Fol.* ovat.-lanc. *Fl.* alb. *Calc.* gracile.
16. *I. Hookeriana* (no. 75). Fruticosa, ramosa. *Fol.* oval. *Fl.* magni. *Calc.* magnum.
- § G 17. *I. Walkeri* (no. 84). *Fl.* rubri. *Labellum* longe saccatum.
18. *I. elongata* (no. 85). *Fl.* rubri. *Labellum* gracile, calcaratum.
19. *I. cornigera* (no. 86). *Fl.* flavi. *Labellum* calcari mediocri apice incurvo.

III. PENINSULÆ OCCIDENTALIS (MALABAR, &c.).

- § A 1. *I. scapiflora* (no. 1). *Fol.* glabra. *Calc.* mediocr. incurvum.
 2. *I. modesta* (no. 2). *Fol.* pilosa. *Calc.* mediocr. incurvum.
 3. **I. acaulis* (no. 3). *Fol.* orbicul. *Calc.* gracillimum.
 4. *I. rivalis* (no. 4). *Fol.* ovat.-oblong. *Calc.* gracillimum.
 5. *I. Stocksii* (no. 5). *Fol.* late ovat. *Calc.* 0.
- § B 6. *I. Gardneriana* (no. 9). *Fol.* terna.
 7. *I. inconspicua* (no. 14). *Fol.* opposita. *Fl.* minuti, ecalcarati.
 8. *I. Lawii* (no. 13). *Fl.* ampli, ecalcarati.
 9. **I. chinensis* (no. 6). *Fol.* stipulata, subsessilia. *Fl.* magni. *Calc.* filiforme.
 10. *I. diversifolia* (no. 12). *Fol.* exstipulata. *Fl.* mediocres. *Calc.* filiforme. *Caps.* brevis.
 11. *I. Kleinii* (no. 15). *Fl.* minimi. *Calc.* filiforme. *Caps.* linearis.
 12. *I. setosa* (no. 16). *Fl.* magni. *Calc.* filiforme. *Fol.* stipul. longe petiolata.
 13. *I. rufescens* (no. 10). *Calc.* breve. *Fl.* mediocres, rubri, pubescentes.
 14. *I. Dalzellii* (no. 18). *Calc.* breve. *Fl.* flavi, majusculi.
 15. *I. tenella* (no. 17). *Calc.* breve. *Fl.* minimi.
 16. *I. tomentosa* (no. 11). *Calc.* breve. *Fl.* mediocr. pubesc.
 17. **I. oppositifolia* (no. 7). *Calc.* breve. *Fl.* majusc. glabri. *Folia* stipulata.
Pedunculi 1-flores.
- § C 18. **I. latifolia* (no. 20). Herbacea. *Fol.* suboppos. et verticillat. *Fl.* ampli.
 19. *I. lucida* (no. 21). Herbacea. *Fol.* opposit. membran. *Fl.* minores.
 20. *I. Leschenaultii* (no. 22). Robusta. *Fol.* opposita, rigida.
Pedunculi 2-6-flores.
21. *I. verticillata* (no. 31). Herbacea. *Fol.* verticillat. *Fl.* majusc.
 22. *I. Goughii* (no. 33). Debilis. *Fol.* opposit. *Fl.* parvi.
- § D 23. **I. Balsamina* (no. 34). Glabrata. *Fol.* angusta. *Calc.* gracile.
 24. *I. scabriuscula* (no. 35). Puberula. *Fol.* angust. *Calc.* breviss.
 25. *I. pendula* (no. 41). Parvula, pilosula. *Fl.* minimi. *Calc.* 0.
 26. *I. Mysorensis* (no. 42). Parvula, glaberr. *Fl.* minim. *Calc.* breve.
 27. *I. Munronii* (no. 43). Pubescens. *Fl.* purpurei. *Sepala* magna. *Calc.* conicum, hamatum.
 28. *I. dasysperma* (no. 44). Glabra. *Sepala* parva. *Calc.* gracile.
 29. **I. flaccida* (no. 45). Glaberr. *Fl.* mediocr. *Sepala* parva. *Calc.* gracillimum.
 30. *I. pulcherrima* (no. 46). Glabra. *Fl.* maxim. *Sepala* minuta. *Calc.* longiss. gracillimum.
 31. *I. Hensloviana* (no. 47). Suffrutic. pubescens. *Sepala* ampla. *Fl.* magni. *Calc.* gracile.

- § E 32. *I. fruticosa* (no. 59). *Elata, fruticosa. Fl. ampli. Calc. gracile.*
 33. *I. Jerdoniæ* (no. 62). *Humilis, crassa. Sepala parva. Labell. longe saccatum.*
 34. *I. auriculata* (no. 63). *Humilis, crassa. Sepala maxima. Labell. longe saccatum.*
 35. *I. viridiflora* (no. 64). *Humilis, crassa. Sepala parva. Labell. conicum, calare incurvo.*
 § F 36. *I. umbellata* (no. 70). *Simplex. Fol. subverticill., brevi-petiol. Calc. gracile.*
 37. *I. uncinata* (no. 72). *Simplex. Fol. longe petiol. Calc. breve, incurvum.*
 38. *I. viscida* (no. 73). *Ramosa. Fol. longe petiol. Pedunc. viscid. Calc. gracile.*
 39. *I. grandis* (no. 76). *Robusta. Bract. magn. Fl. maxim. Calc. elongat. gracile.*
 40. *I. campanulata* (no. 77). *Fruticosa. Bract. magn. Fl. margin. Calc. perbreve, incurvum.*
 § G 41. *I. maculata* (no. 83).

IV. MONT. KHASIA, SILHET, &c.

- § B 1. **I. chinensis* (no. 6). *Simplex. Fol. opposita, brevi-petiol. Calc. gracile.*
 2. *I. salicifolia* (no. 19). *Ramosa. Fol. opposit. et tern. brevi-petiol. Calc. breve.*
 § C 3. **I. multiflora* (no. 23). *Elata, ramosa. Fol. opp. tern. et alt. longe petiol. Pedunc. 1-flori.*
 4. *I. radicans* (no. 24). *Humilis, simplex. Fol. opp. brevi-petiol. Pedunc. 1-3-flori. Labell. saccat. Calc. breve.*
 5. **I. trilobata* (no. 25). *Elata, ramosa. Fol. opp. tern. et alt. Pedunc. solitar. 2-5-flori.*
 6. *I. flavida* (no. 26). *Elata, ramosa. Fol. opp. et tern., longe petiol. Fl. flavi. Pedunc. solit., 2-4-flor. Labell. saccat. Calc. tumidum.*
 § D 7. **I. Balsamina* (no. 34).
 § E 8. **I. arguta* (no. 52). *Fol. longe acuminat. Bract. subulatæ, tortæ. Calc. breviusc.*
 9. **I. discolor* (no. 53). *Fol. ovato-acuminat. Bract. late ovatæ. Calc. breve, incurvum.*
 10. *I. porrecta* (no. 54). *Fol. acuta. Bract. setacæ. Sep. parva. Calc. attenuatum, incurvum.*
 11. *I. bella* (no. 55). *Fol. acuta. Bract. setacæ. Sep. parva. Calc. gracile, tortum, puberulum.*
 12. *I. racemulosa* (no. 56). *Fol. acuminat. Fl. 6-8 intense violac. Sep. majuscul. Calc. breve, incurvum.*
 13. **I. latiflora* (no. 57). *Fol. acuminat. Fl. ampl. Sep. ampl. Calc. rectiusculum, elongatum.*

14. **I. pulchra* (no. 58). Humilis. *Fl.* ampli. *Sep.* magna. *Calc.* conicum, incurvum.
15. **I. Jurpia* (no. 60). Fruticosa. *Fl.* ampli. *Sep.* parva. *Labell.* ventricosum. *Calc.* robusto incurvo.
- § F 16. *I. bracteata* (no. 65). *Bract.* pectinato-crinitæ.
17. **I. acuminata* (no. 74). Humilis, simplex. *Calc.* elongatum.
18. **I. lævigata* (no. 78). Fruticosa. *Labell.* ventricosum. *Calc.* breve.
- § G 19. **I. racemosa* (no. 80). *Ped.* verticillati.
20. **I. tingens* (no. 88). *Ped.* alterni. *Calc.* breviusculum.
21. **I. leptoceras* (no. 91). *Ped.* alterni. *Calc.* elongatum.

V. MONT. HIMALAYA.

- § C 1. **I. multiflora* (no. 23). Elata. *Fol.* opp. alt. et tern. *Pedunc.* 1-flores.
2. **I. trilobata* (no. 25). Elata. *Fol.* opp. alt. et tern. *Pedunc.* 2-5-flores.
3. *I. Roylei* (no. 27). Elata, caule tereti. *Bract.* ovato-lanceol. *Pedicell.* umbell. *Capsula* brevis, clavata.
4. *I. Thomsoni* (no. 28). Elata, caule tereti, lævi. *Bract.* subulatæ. *Calc.* conicum.
5. *I. amplexicaulis* (no. 30). Elata, caule 4-gono. *Fol.* supern. altern. amplexicaulia. *Capsula* linearis.
6. *I. sulcata* (no. 29). Elata, caule tereti sulcato. *Capsula* nutans, linearis.
- § D 7. **I. Balsamina* (no. 34). *Fol.* longe lanceolata. *Calc.* rectum v. curvum.
8. *I. spirifer* (no. 48). *Fol.* ovato-lanceol. *Calc.* breviusculum spiraliter involutum.
- § E 9. *I. serrata* (no. 50). Gracilis, glabra. *Bract.* subulat. rectæ. *Sep.* parva. *Calc.* gracile, abrupte incurvum.
10. *I. scabrida* (no. 51). Robusta, pubescens. *Bract.* subulat. rectæ. *Sep.* ampla. *Labell.* conicum. *Calc.* incurvum.
11. **I. arguta* (no. 52). Gracilis, glabra. *Bract.* subulat. tortæ. *Sep.* majuscula. *Labell.* infundib. *Calc.* incurvum.
12. **I. discolor* (no. 53). Erecta, subramosa. *Bract.* late ovatæ. *Sep.* parva. *Calc.* apice involutum.
13. **I. latiflora* (no. 57). Humilis, robusta. *Bract.* lanceolat. *Sep.* ampla. *Calc.* gracile, elongatum.
14. **I. pulchra* (no. 58). Humilis, gracilis. *Flor.* ampli. *Bract.* lanceolat. *Sep.* ampla. *Calc.* conicum, incurvum.
15. **I. Jurpia* (no. 60). Fruticosa. *Fl.* magni. *Sep.* parva. *Labell.* ventricosum.
16. *I. puberula* (no. 61). Pubescens. *Fl.* mediocr. violac. *Sep.* majusc. *Calc.* gracile, incurvum.

§ F 17. **I. lævigata* (no. 78). Fruticosa. *Fl. magni. Bract. et Sep. amplæ.*

a. *Pedicelli verticillati.*

§ G 18. **I. racemosa* (no. 80). *Fl. parvi flavi.*

19. *I. bicornuta* (no. 81). *Fl. majusc. lilacini. Labell. inflatum.*

20. *I. longicornu* (no. 82). *Fl. majusc. Labell. conicum v. saccatum.*

b. *Pedicelli alterni.*

21. *I. insignis* (no. 87). *Fol. angusta. Sep. ampla. Fl. rosei. Calc. elongatum, gracile.*

22. **I. tingens* (no. 88). *Fl. parvi, flavi. Calc. breviusculum.*

23. *I. longipes* (no. 89). *Pedicelli gracillimi, patentes. Fl. medioc. flavi. Sep. parva. Labell. conicum. Calc. hamatum.*

24. *I. urticifolia* (no. 90). *Fl. majusc. lilacini. Bract. caducæ. Sep. ovata. Labell. saccatum. Calc. breve, incurvum.*

25. **I. leptoceras* (no. 91). *Fl. inter minores, flavi. Sep. ovata. Labell. infundibulif. Calc. gracile.*

26. *I. laxiflora* (no. 92). *Fol. longe petiol. ovata. Fl. majusc. Sep. parva. Labell. infundibulif. Calc. gracile.*

27. *I. glauca* (no. 94). *Fol. subtus glauca.*

28. *I. tuberculata* (no. 95). *Fl. mediocres v. parvi, lilacini. Labell. gibbum, ecalcaratum. Capsula clavata, tuberculata.*

29. *I. brachycentra* (no. 96). *Fl. parvi, flavi. Labell. conicum, ecalcaratum.*

30. *I. Lemanni* (no. 93). *Fol. longe petiolata, obtuse sinuato-dentata. Fl. rosei.*

I. IMPATIENS, *L.*

A. *SCAPIGERÆ* (see p. 112).

1. *I. SCAPIFLORA* (Heyne in Roxb. *Fl. Ind. Ed. Wall.* ii. 464; *Wall. Cat.* 4758!). Glaberrima, foliis reniformi v. orbiculari-cordatis, bracteis late ovatis obtusis, sepalis oblique late ovatis, calcare flore brevioris incurvo clavato obtuso, vexillo brevi cucullato latiore quam longo, alis 3-lobis.—*Wight*, p. 967, non *Hook. Bot. Mag.* t. 3587.

I. scapiflora, *Wight & Arn. Prodr.* 137 in part.; *Paxt. Mag. Bot.* v. p. 101 cum ic.

Hab. Montibus Malabar! Heyne, *Wight*, &c. (fl. Jun.—Octob.).

Herba pedalis. *Folia* 2–3" lata, integerrima v. remote denticulata, nervis radiantibus. *Flores* $\frac{1}{2}$ – $\frac{2}{3}$ " lati. *Capsula* oblongo-lanceolata.

2. *I. MODESTA* (*Wight in Madr. Journ. of Science*, v. p. 13, et *Icones*, t. 968). Foliis ovato-cordatis acutis crenato-serratis supra pilosis subtus glaucis, bracteis ovatis apice subulatis, sepalis ovato-oblongis parvis, calcare flore brevioris obtuso, alis 3-lobis. An var. *I. scapifloræ*?

Hab. Mont. Malabar! *Wight* (fl. Jul.-Aug.).

Ab *I. scapiflora* differt foliis supra pilosis ovatis acutis, floribus minoribus, bracteis apice subulatis, sepalis minoribus et calcare brevior.

3. *I. ACAULIS* (*Arn. in Hook. Comp. Bot. Mag.* i. 325). Glabra, foliis orbiculatis oblongisve basi rotundatis cordatisve, bracteis ovatis acutis, pedicellis elongatis, sepalis parvis ovatis obtusis, calcare gracillimo elongato, alis 2-lobis?—*Thwaites, En. Pl. Ceylon.* 68.

I. scapiflora, *Hook. Bot. Mag.* t. 3587; *Wight, Ic. Descript.* t. 967; et *Wight & Arn. Prodr.* quoad varietat. calcare interdum elongato.—

I. bulbosa, *Moon. Cat.*?

β. Foliis profunde cordatis grosse crenatis.

Hab. Mont. Ceyloniæ! *Moon, Walker, &c.*, et Malabariæ! *Nimmo, Lobb, &c.*, var. β, Concan?, *Herb. Stocks.*

Variat insigniter statura; 2-12" alta, et floribus $\frac{1}{2}$ " ad $1\frac{1}{4}$ " latis.—*Vexillum* breve, galeatum, latius quam longum, retusum.

Thwaites (En. Plant. Ceylon, 68) suspects that this cannot be Heyne's plant, because that is described by Wallich as having the spur several inches in length; but in some of our specimens it is $2\frac{1}{2}$ -3 inches in length.

4. *I. RIVALIS* (*Wight in Madr. Journ. Science*, v. p. 13, t. viii. et *Icones*, t. 751). Foliis oblongis ellipticis ovato-oblongisve basi obliquis superne pilosis glabratissve, bracteis ovatis subacutis, sepalis late ovatis obtusis, calcare gracillimo elongato, alis 3-lobis.—An var. *I. acaulis*?

Hab. Mont. Malabariæ! et Concan! *Wight, Dalzell, &c.* (fl. July, August). Statura variabilis 2-12" alt. *Folia* serrata v. integerrima, basi attenuata, obtusa v. subcordata. *Flores* $\frac{1}{2}$ - $1\frac{1}{4}$ " lati, vexillo fornicato brevi. *Semina* hispida.

In the dried state it is impossible to distinguish this from *I. acaulis*, of which I suspect it is a variety, as does *Thwaites*.

5. *I. STOCKSII* (*H. f. & T.*). Parvula, glaberrima, foliis late ovatis, membranaceis, bracteis ovatis acutis, sepalis late ovatis obtusis, labello basi saccato (calcare nullo), alis 3-lobis.

Hab. Mont. Peninsulæ (prov. Canara! et Maisor?), *Herb. Stocks. et Law.*

Herba parvula, 2-4", tenerrima. *Petoli* graciles, foliis subæquilongi.

Folia pollicaria, obscure crenato-dentata. *Flores* 6-8, sub $\frac{2}{3}$ " lati.

Sepala vexillo orbiculato, subæquilonga. *Labellum* ovatum, concavum.

B. OPPOSITIFOLLÆ (vide p. 112).

6. *I. CHINENSIS* (*Linn. Sp. Pl.*). Glabra, caule erecto, angulato, foliis setaceo-stipulatis subsessilibus linearibus acutis remote serratis subtus glaucis, pedicellis solitariis fasciculatisve, sepalis linearibus, calcare gracili elongato incurvo, vexillo orbiculari acuminato, alis semi-obovatis basi auriculatis.

I. fasciculata, *Lamk. Enc. Méth.* i. 359, var. α; *Wight, Ic.* 748 et *Madr. Journ. Sc.* v. p. 14; *W. & Arn. Prodr.* 138; *Hook. Bot. Mag.* 4631.

—*I. heterophylla*, *Wall. in Roxb. Fl. Ind.* ii. 458, *Cat.* 4748!—Bal-

samina fasciculata, *D.C. Prodr.* i. 686.—*I. setacea*, *Coleb. in Hook. Ex. Flor.* ii. 137; *Miq. Plant. Hoh.* 1139.

Var. β . Foliis late oblongis obovatisve.

Hab. Mont. utriusque Peninsulæ a Concan! ad Travancore! alt. 5-8000 ped., *Wight, &c.*, Birma! *Wallich!* Malacca, *Griffith!* montibus Khasiæ alt. 3000-5000 ped.! *de Silva, &c.* (fl. May-August). (v. v.)

Dist. Hong-Kong! *Hance.*

Planta valde variabilis. *Caules* simplices v. ramosi, basi repentés ad nodos setas stipulæformes crassas 2 v. plures gerentes v. omnino nudi. *Folia* plerumque basi cordata, 2-4", subcoriacea, superne glaberrima v. hispidula. *Pedicelli* patentes; flores læte rosei v. albi, interdum purpureo-variegati, 1-2" lati, locis humidioribus umbrosisve depauperati. *Capsula* elliptico-oblonga, utrinque attenuata, vix $\frac{1}{2}$ ". *Semina* orbicularia, atra, lævia, opaca v. subnitida.

In *Bot. Mag.* this plant is erroneously supposed to be a native of Ceylon and the whole Himalayan range. Its broad-leaved form is certainly the *I. chinensis*, L., as I have ascertained from the Linnæan Herbarium.

7. *I. OPPOSITIFOLIA* (*Linn. Sp. Pl.*). Flaccida, ramis gracilibus, foliis glanduloso-stipulatis linearibus oblongo-linearibusve integris serratisve, pedicellis solitariis fasciculatisque, sepalis linearibus, vexillo late ovato v. orbiculato acuminato, labello conico calcare brevi recto v. incurvo.—*Wight & Arn. Prodr.* 139; *Wight*, no. 883.

I. ros-mariniifolia, *Retz. Obs.* v. 29; *D.C. Prodr.* i. 686; *Wight, Ic.* 750, in *Madras Journ. Sc.* v. p. 14, t. ix.—*I. Mysorensis*, *Wall. Cat.* 4743 A!

Hab. Mont. tropicis Malabar! Ceylon! et penins. Malay.! frequens (fl. Aug.-Nov.).

Caulis 4-10" simplex v. ramosus. *Folia* insigniter varia, membranacea, sessilia v. breve petiolata. *Flores* $\frac{1}{2}$ - $\frac{3}{4}$ " lati, albi v. pallide rosei. *Labellum* valde varians, calcare brevi. *Capsula* acuminato-rostrata, 2-6 sperma. *Semina* oblonga, paulo compressa, atro-brunnea, subnitida, funiculo substrophiolato.

Thwaites, *En. Pl. Ceylon (errata)* remarks that Mr. Ferguson, having examined Hermann's plant, considers the *I. rosmarinifolia* of Retz to be the true Linnean *I. oppositifolia*, and the fact is, that the two plants are one and the same. It is extremely common, and so variable, that no descriptions, plates, and specimens altogether agree: hence the confusion. *I. oppositifolia* of Wight and Arnott, as described from Wallich and Heyne's specimens, has the narrow capsule of *I. Kleinii*, with a short conical, nearly straight spur, but in Heyne's, Wallich's, and Wight's specimens, the ripe capsule is broadly elliptical, and the spur often incurved.

8. *I. GRIFFITHII* (*H. f. & T.*). Erecta, foliis superioribus ternis petiolatis anguste lanceolatis acuminatis marginibus remote serrulatis basi setosis subtus glaucis, pedicellis solitariis, sepalis ovato-oblongis acu-

minatis, calcare filiformi elongato, vexillo amplo obcordato dorso rostellato, alis late bilobis.

Hab. Peninsula Malayana; Monte Ophir! et Gerai! prope Malacca, alt. 3000 ped.! *Griffith, Lobb, Cumming.*

Species pulcherrima foliis ternis facile distinguenda, sparse puberula præcipue ad nodos petiolosque. *Folia* 2-3" superne puberula. *Pedicelli* graciles. *Flores* 1" diametr., rosei? *Calcar* pedicello longius.

9. *I. GARDNERIANA* (*Wight, Icones*, 1050). Glabra, caule basi repente radicante dein erecto, foliis oppositis et ternatim verticillatis ovato-lanceolatis acuminatis argute serratis basi ciliatis, pedicellis solitariis gracilibus, sepalis oblongis longe acuminatis, labello cymbiformi calcare gracili elongato, vexillo dorso alato acuminato, alis bipartitis segmentis retusis horizontaliter patentibus.

Hab. Mont. tropicis Malabariæ locis udosis apertis infra Sispara! *Wight* (fl. Jan., Feb.).

Herba spithamæa et altior. *Folia* 1-2", supra sparse pilosula. *Pedicelli* suberecti, 2-3". *Flores* sub $\frac{3}{4}$ " lati. *Capsula* oblonga. *Semina* glabra.

I. Griffithii simillima; sed differt foliis ovatis, vexillo late obcordato, floribusque maioribus.

10. *I. RUFESCENS* (*Benth. in Wall. Cat.* 4747!). Foliis sessilibus oblongis ovato v. obovato-oblongis acutis serratis supra scaberulis subtus pallidis nervis rufo-tomentosis, pedicellis subsolitariis floribusque pubescentibus, sepalis lineari-lanceolatis setaceo-acuminatis, labello saccato calcare nullo, vexillo late oblongo acuminato, alis breviusculis bilobis lobo superiore auriculæformi.—*Wight & Arn. Prodr.* 138, *Icones*, t. 969. (An var. *I. tomentosa*?)

Hab. Mont. tropicis Malabariæ! et Maisor! *Wight, &c.*

Caules 6-12", superne sæpius tomentosi. *Folia* subcoriacea, *I. fasciculata* textura subsimilia. *Flores* $\frac{1}{3}$ - $\frac{3}{4}$ " lati, rosei? *Capsula* $\frac{1}{4}$ ", rostrato-acuminata. *Semina* ut in *I. oppositifolia*.

11. *I. TOMENTOSA* (*Heyne in Wall. Cat.* 4751! an *Wight*?). Foliis breve petiolatis oblongo-lanceolatis acutis serratis supra hispidulis, pedicellis solitariis binisve floribusque pubescentibus, sepalis lineari-lanceolatis acuminatis, labello sublonge saccato calcare brevi abrupte terminato, vexillo late oblongo acuminato, alis bilobis.

I. reticulata, *Wall. Cat.* 4750! *Wight & Arn. Prodr.* 139, ? *Wight*, p. 749 (var. *glabrata*).—*I. ramosissima*, *Dalzell in Hook. Kew Journ. Bot.* 1851, iii. 230.

Hab. Mont. Malabariæ! et Maisor! *Heyne, Wight, &c.*; Pegu! *Wullich* (ex *Exempl. manca*) (fl. Aug., Sept.).

Proxime affinis ut videtur *I. rufescenti* (ejus varietas?) a qua differt præcipue si non solum, labello breviter calcarato.

12. *I. DIVERSIFOLIA* (*Wall. Cat.* 4749!). Diffusa, foliis lineari- v. ovato-oblongis glaberrimis, basi subcordatis argute serratis, pedicellis soli-

tariis fasciculatisve, sepalis linearibus acuminatis, calcare filiformi elongato, vexillo parvo, alis late semiobovatis.—*Descript. ex Wight & Arn. Prodr.* 139.

I. heterophylla, *Wall. Cat.* 4748 b.—I. Arnottiana, *Miquel, Plant. Hoh.* 275.

Hab. Mont. temperatis Malabariæ! et Canaræ! *Klein, Wight, &c.* (fl. Oct.). Species parvula, 4–6", caulibus longe radicanlibus. *Folia* $\frac{3}{4}$ –1 $\frac{1}{2}$ ". *Flores* sub $\frac{1}{2}$ " lati. *Stigmata* (fid. *W. & A.*) distincta.

13. I. LAWII (*H. f. & T.*). Caulibus erectis ramosis foliisque subtus glaberrimis, foliis breviter oblongis basi obtusis sessilibus superioribus sensim minoribus cordato $\frac{1}{2}$ -amplexicaulibus remote serratis supra scaberulis, pedicellis breviusculis, floribus magnis, sepalis linearibus falcatis, vexillo orbiculari apice rostellato, labello parvo ecalcarato late concavo, alis maximis lobis lateralibus parvis.

Hab. Canara! et Malabar! *Law.*

Species pulcherrima, habitu ramoso *I. diversifoliae*, qua differt floribus magnis, labello ecalcarato, foliis brevioribus superioribus sensim minoribus pedicellisque brevioribus.—*Caules* pedales. *Folia* $\frac{1}{2}$ –1" longa, subacuta, subtus pallida. *Pedicelli* plerumque folio breviores linea puberula instructi, fructiferi deflexi. *Flores* $\frac{3}{4}$ " lati, pulchre violacei? *Capsulae* immaturæ lanceolatae vix $\frac{1}{2}$ " long.

A very beautiful species or form allied to *I. inconspicua* and *diversifolia*, but very different in stature and the size of the flower; it is much branched, and the leaves are smaller upwards.

14. I. INCONSPICUA (*Benth. in Wall. Cat.* 4741!). Parvula, ramosa, diffusa, glaberrima, foliis proteis anguste oblongis linearibus lanceolatisve serratis obtusis acutis acuminatisve, pedicellis puberulis, floribus minutis, sepalis lineari-subulatis, labello naviculari acuminato basi subsaccato ecalcarato, vexillo ovato acuminato, alis bilobis lobo superiore minore inferiore obovato.—*Wight & Arn. Prodr.* 139; *Wight*, p. 970.

I. pusilla, *Heyne in Wall. Cat.* 4745, fid. *W. & Arn.* non *Herb. Hook.*—An I. filiformis, *Wight & Arn. Prodr.* 140? an I. Mysorensis, *Roth. Wall. Cat.* 4743 in part.?

Hab. Mont. temperatis Malabariæ! *Heyne, Wight, Foulkes, &c.*; et Concan? *Stocks, &c.* (fl. Nov.).

Planta valde inconspicua et variabilis. *Folia* in exemplare cl. Wallichii (no. 4741 in *Hook. Herb.*) anguste linearia, basi cordata, 2-pollicaria; in cæteris et in *Icone Wightii* breviora oblonga lanceolata. *Flores* pallidi, $\frac{1}{4}$ – $\frac{1}{2}$ " lati.—Exemplar *I. pusillæ*, *Heyne, Wall. Cat.* 4745 in *Herb. Hook.* diversa est species, calcare instructa.

15. I. KLEINII (*Wight & Arn. Prodr.* 140). Erecta, glabra, diffuse ramosa, foliis longe v. breve petiolatis membranaceis basi biglandulosis obovatis ovatis lanceolatisve acutis subserratis superne glabris v. pilosis subtus glaucis, sepalis lineari-subulatis, labello ovato-acuminato

convexiusculo calcare elongato gracili, vexillo brevi glabro v. pilosulo orbiculato acuminato, alis longe unguiculatis late obovatis vix lobatis, capsula gracili.—*Wight. Ic.* 884; *Arn. in Hook. Comp. Bot. Mag.* ii. 325. *Balsamina minor*, *D. C. Prodr.* i. 686.

Hab. Mont. Malabar! Canara! and Concan! *Heyne, &c.*

The very long slender spur best distinguishes this species from its small-flowered, opposite-leaved allies, except *I. diversifolia*, which has sessile leaves, and the following.

16. *I. SETOSA* (*H. f. & T.*). Herbacea, ramosa, ramis oppositis, foliis petiolatis setoso-stipulatis ovato-lanceolatis acuminatis obscure serratis margine basin versus distanter longe setosis utrinque pilosulis, pedicellis gracilibus, sepalis majusculis oblique ovatis, calcare elongato filiformi gracillimo incurvo.

Hab. Mont. Malabar! *Herb. Wight.*

Herba 2-pedalis. *Folia* $1\frac{1}{2}$ – $2\frac{1}{2}$ " , submembranacea, subtus glauca, basin versus limbi et petioli pilis longis patulis flaccidis ciliata et stipulata. *Pedunculi* 1" et ultra. *Flores* violaceo-purpurei, $\frac{2}{3}$ " lati; calcare gracillimo, $1-1\frac{1}{2}$ ".

The long hairs towards the base of the leaves, at the margin, and at the position of the stipules, together with the rather large purple flower, and very long slender ascending spur, distinguish this from all others of the opposite-leaved 1-flowered section. I have seen but one specimen in Wight's Herbarium.

17. *I. TENELLA* (*Heyne in Wall. Cat.* 4746 A!). Parvula, erecta, subflaccida, foliis breve petiolatis lineari-oblongis lanceolatisve serratis subtus pallidis, floribus parvis glabris, sepalis linearibus acuminatis, labello naviculari v. conice saccato in calcar breve rectum v. incurvum attenuato, galea brevi, alis longe unguiculatis vix lobatis semi-obovatis falcatis.—An *I. Kleinii* var. *parviflora*?

I. pusilla, *Heyne, Wall. Cat.* 4745 in *Herb. Hook.*—*I. tenuicula*, *Steud.*

Hab. Mont. Malbariæ tropicis! *Heyne, Lobb, Jacquemont*, no. 1501.

Herba flaccida, ramosa, 3–6 pollicaris; ramis gracilibus. *Folia* varia, $1-2\frac{1}{2}$ pollicaria, petiolata v. subsessilia. *Flores* parvi, sub $\frac{1}{3}$ " lati, purpurei? *Capsula* tumidior quam in *I. Kleinii*. *Pedicelli* fructiferi horizontales (fid. *W. & Arn.*), erecti et deflexi in exempl. *Lobb. lecto.*

18. *I. DALZELLII* (*H. f. & T.*). Glaberrima, ramosa, foliis (2–3") omnibus breve petiolatis ovato- v. oblongo-lanceolatis basi cordatis acuminatis spinuloso-serrulatis supra puberulis subtus pallidis, floribus mediocribus flavis, sepalis majusculis lineari-lanceolatis acuminatis, labello saccato calcare brevi curvo terminato, vexillo late cucullato dorso alato.

Hab. Mont. tropicis Concan! *Dalzell, Hb. Stocks* (fl. Aug.).

Caules crassi, 8–14 pollicares. *Folia* $\frac{1}{2}$ – $1\frac{3}{4}$ " utrinque glabra v. superne puberula. *Pedicelli* solitarii v. pauci, glaberrimi. *Flores* glaberrimi, flavi (fid. *Dalzell*), sub $\frac{1}{2}$ " lati. *Capsula* $\frac{1}{2}$ unc. longa, medio turgida,

utrinque breviter attenuata. *Semina* 3-4, magna, oblonga, testa tenuiter crustacea, atra, nitida.—*Habitus et folia* fere *I. oppositifolii*; sed flores et capsulæ majores. *Capsulæ I. fasciculatæ* sed seminibus paucis, magnis, oblongis, subsplendentibus.

19. *I. SALICIFOLIA* (*H. f. & T.*). Erecta, robusta, pubescens v. tomentosa, foliis (3-4") oppositis verticillatisque stipulatis breve petiolatis lanceolatis acuminatis setuloso-serratis, pedicellis fasciculatis brevibus, floribus pubescentibus glabrativis, sepalis parvis lanceolato-subulatis, labello magno longe saccato basi calcare brevi uncinato terminato, vexillo obovato dorso carinato et cornuto, capsula clavata glaberrima.

Hab. Mont. Khasia tropicis, alt. 3000-4000 ped. ! *Lobb, &c.* (fl. Aug.-Oct.). (v.v.)

Caules 2-3 pedales, oppositi, ramosi. *Folia* 3½", submembranacea, serraturis simplicibus v. 1-setulosis, plerumque basin versus foliorum setulosis. *Stipulæ* e fasciculis setarum carnosæ ad basin petiolorum, interdum 0. *Pedicelli* graciles, pollicares, interdum pedunculo communi brevissimo fasciculati. *Flores* speciosi, 1" lati, purpurei. *Calcar* longitudine variabile.

C. SUBVERTICILLATÆ (vide p. 112).

a. Pedunculi uniflores (in *I. multiflora* interdum 2-3 flores).

20. *I. LATIFOLIA* (*Linn. Sp. Pl.*). Glaberrima, foliis suboppositis subverticillatisque 2-4" longe petiolatis lanceolatis v. ovato-lanceolatis acuminatis margine crenato-serratis setulosisque, floribus amplis sepalis parvis ovato-cuspidatis, labello acuminato concavo calcare elongato gracili recto v. incurvo, vexillo obcuneato cornuto, alis bilobis, seminibus reticulatis.—*Wight, Ic.* t. 741.

I. cuspidata, *Wight et Arnott in Hook. Comp. Bot. Mag.* ii. 321.

Var. *β bipartita*, foliis omnibus alternis longioribus, *Thw. En.* 65.—*I. bipartita*, *Arn. in Comp. Bot. Mag.* i. 322.—*I. floribunda*, *Wight in Madr. Journ. Sc.* v. p. 7.

Hab. Mont. tropicis Malabaræ!; Nilgherries! et Ceylon! *Wight, Lobb, &c.*; Concan v. Canara! *Law, &c.*; var. *β* sylvis subtropicis Ceyloniæ alt. 5000-6000 ped. ! *Walker, &c.* (fl. Oct.).

I. Leschenaultii et *I. lucidæ* valde affinis (an illarum forma luxurians?). A priore differt foliis sæpius subverticillatis, longius petiolatis, majoribus, flaccidioribus, vexillo majore.—*Folia* subtus secus nervos sparse pubescentia. *Flores* 1" lati, calcare gracili plus minusve incurvo apice inflato, emarginato v. bifido. *Capsula I. Leschenaultii* et *latifoliæ* sed seminibus (fid. *Wt.*) reticulatis.

According to Wight, this differs from *I. Leschenaultii* in the form of the flower, long straight spur, and reticulated seed, but all my specimens have incurved spurs (as in *I. Leschenaultii*), the seeds in all seem to have a spongy testa which is rugose when dry, and the difference in the form of the details is not so strong in my specimens as in Wight's figure. *I.*

Leschenaultii is probably a more robust, smaller leaved and flowered state of this plant. Thwaites (*Enum.* p. 65), who unites *bipartita*, Arn., with *cuspidata*, remarks that the anterior lobe of the petal varies a good deal. I have a specimen marked *I. cuspidata*, W. & A., by Gardner, and gathered by himself on the Nilgherries, in which the capsule is $\frac{3}{4}$ " long, and the leaves, almost all alternate, have long soft spines at the base and on the petiole.

I have no doubt of this being Linnæus's *I. latifolia*, having examined the plant so named in the Linnean Herbarium; it consists of only the top of the stem, with the upper alternate leaves and one very large flower, with a curved spur that is forked at the tip for a long way up. There is no authority for the specimen in Linnæus's Herbarium, but *I. bifida* is written on the paper; so this is probably the original *I. bifida*, Thunb., described by Thunberg as having a bifid spur, and erroneously supposed to have been a native of the Cape of Good Hope, where it has never since been found.

21. *I. LUCIDA* (Heyne in Wall. Cat. 4738!). Glabra, ramosa, foliis (2-4") longe petiolatis membranaceis inferioribus alternis, vel aliis oppositis aliis alternis lanceolatis ovato-lanceolatisve acuminatis crenatis basi setosis, pedicellis subsolitariis, sepalis parvis ovatis acuminatis, labello concavo calcare elongato gracili, vexillo obovato, alis bilobis, lobis obovatis.—An. var. *I. latifolia*, L., floribus minoribus?

I. latifolia, Wt. & Arn. Prodr. 138; Wall. Cat. 4737! non Linn.

Hab. Mont. tropicis Malabariæ! Heyne, Wight, Gardner.

Herba 1-2', caule basi crassiusculo. Petioli $\frac{1}{2}$ -1", graciles. Folia subnitida, utrinque angustata, flaccida. Flores pro planta parvi, $\frac{1}{2}$ - $\frac{2}{3}$ " lati, albi v. pallide rosei (Wight). Capsula $\frac{1}{2}$ unc. longa, elliptica, turgida, utrinque attenuata, glabra v. pilosa. Semina sub 4, magna, oblonga, compressa, opaca, grosse reticulata.

Wight and Arnott remark that this differs from *I. Leschenaultii* in the densely pubescent capsules, but I find that to be a very inconstant character.

22. *I. LESCHENAULTII* (D.C. Prodr. i. 686; Wall. Cat. 4739). Suffruticosa, glaberrima, ramosissima, foliis 1-1 $\frac{1}{2}$ pollicaribus plerisque oppositis petiolatis lanceolatis v. ovato-lanceolatis acuminatis serratis, pedicellis solitariis v. binis, sepalis parvis ovato-subulatis, labello saccato acuminato calcare elongato gracili curvo, vexillo late obovato rostellato, alis bilobis lobis obovatis.—Wight & Arn. Prodr. 136.

An var. *I. latifolia*, L.?; Wight, p. 970 bis.

Hab. Mont. Ceyloniæ, Leschenault (fid. D.C.) et Malabariæ! frequens, Wight, &c. (fl. tot. ann.).

Suffrutex 8-pedalis, ramosus, foliosus, caulibus ramisque suboppositis crassiusculis. Folia subcoriacea, petiolo $\frac{1}{4}$ - $\frac{1}{3}$ " longo. Flores fere 1" diametr., pallide rosei v. albi. Capsule et semina *I. latifolia* simillima sed minora.—Potius varietas *I. latifolia*, rigidior, densior, foliis minoribus, brevius petiolatis, magis serratis.

23. *I. MULTIFLORA* (Wall. Cat. 4742 !). Elata, ramosa, foliis 3-5" oppositis ternis v. alternis stipulatis longe petiolatis membranaceis ovato-lanceolatis utrinque acuminatis crenato-serratis et basin versus setulosis utrinque sparse puberulis v. glaberrimis, pedicellis gracilibus breviusculis rarius in pedunculum brevem fasciculatis, floribus purpureis, sepalis parvis subulatis falcatis, labello saccato sacco basi obtuso calcare brevi v. elongato uncinato terminato, vexillo obovato galeato dorso cornuto, alis parvis.

Exemplar foliis omnibus oppositis pedicellis fasciculatis vix basi unitis.—
Wall. Cat. 4742 !

Exemplar foliis oppositis et ternis=*tripetala*, Roxb., Wall. Cat., *I. ternifolia*, Hb. Ham. 4752 B !

Hab. Himalaya orientali tropica ; Sikkim, alt. 2000-5000 ped. ! Mont. Khasia alt. 0-3000 ped. ! *Lobb, &c.* (fl. Aug.-Oct.). (v.v.)

Planta variabilis, affinis *I. trilobata*, sed flores solitarii vel si bini pedunculo communi brevissimo inserti. Ab sectione discrepat foliis interdum omnibus alternis, pedicellisque interdum in pedunculum brevem fasciculatis.

Caulis 2-4 pedalis, laxè ramosus, glaberrimus v. uti folia superne puberulus. *Stipulae* e fasciculis setarum. *Folia* cum petiolo interdum spithamæa. *Pedicelli* pro planta breves, vix unciales. *Flores* $\frac{1}{3}$ -1" lati, longiores quam lati, læte purpurei v. violacei, calcare brevi v. elongato, $\frac{1}{3}$ - $\frac{2}{3}$ ". *Capsula* $\frac{1}{2}$ - $\frac{2}{3}$ " pollicaris, angusto-elliptica, utrinque attenuata. *Semina* 6-8, oblonga, compressa, opaca, rugulosa.

b. *Pedunculi* 2-multiflores (vide *I. multiflora* in § C, *I. bracteata* et *I. janthina* in § F).

24. *I. RADICANS* (Benth. in Wall. Cat. 4763). Glaberrima v. pubescens, caule simpliciusculo stricto robusto folioso, foliis stipulatis (2-4") breve petiolatis anguste lineari- v. oblongo-lanceolatis basi rotundatis acutis subserratis utrinque pubescentibus (raro glabris), pedunculis 1-3-floris, pedicellis gracilibus, floribus magnis, sepalis minimis, labello longe saccato basi calcare brevi uncinato terminato, vexillo galeato dorso gibboso subcornuto, alis parvis.

Hab. Mont. Khasia paludibus temperatis alt. 4000-6000 ped. ! *Mack, Griffith, &c.* (fl. Jul.-Sept.). (v.v.)

Species formosa, habitu foliisque fere *I. fasciculatae*, tota pubescenti-pilosa v. rarius glaberrima.—*Caules* 6-10", stricti, robusti, rarius ramosi. *Stipulae* e fasciculis setarum. *Folia* subcoriacea, subtus pallida. *Pedunculi* pollicares, apice bracteolis lanceolatis tot quot pedicellis muniti. *Flores* speciosi, violaceo-purpurei. *Labellum* saccatum, sæpe $\frac{2}{3}$ " longum et $\frac{1}{2}$ " latum. *Capsula* $\frac{3}{4}$ ", glaberrima, medio turgida, utrinque attenuata. *Semina* oblonga, compressa, testa pallida subrugosa membranacea.

25. *I. TRILOBATA* (Coleb. in Hook. Exot. Flor. ii. t. 141). Elata, ramosa, glabra, foliis (2-4") oppositis alternis subverticillatisque stipu-

latis petiolatis supremis sessilibus ovatis v. ovato-lanceolatis acuminatis crenato-serratis sæpissime ciliolatisque membranaceis, pedunculis solitariis gracilibus elongatis 2-5-floris, pedicellis gracilibus, floribus amplis glaberrimis, sepalis minimis subsetaceis, labello longe saccato sacco conico abrupte v. sensim in calcar incurvum breve v. elongatum angustato, vexillo galeato late obcordato dorso cornuto, alis parvis bilobis.—*Wall. Cat.* 4762 A, et 4763 e *Pundua*, *Wall. Hb.*

Hab. Himalaya orientali tropica; Sikkim, alt. 2000-4000 ped.! *J. D. H.*; Mont. Khasia subtropicis frequentissime, alt. 3000-5000 ped.! (fl. Jul.-Oct.). (v.v.)

Planta variabilis, 3-4'', pulcherrima, ramosa, *I. multifloræ* affinis, sed differt pedunculis 2-5-floris, gracilibus, elongatis.—*Caules* v. rami graciles, elongati, pluries divisi. *Folia* vel omnia opposita, vel inferiora tantum opposita superiora alterna rarius terna v. verticillata, interdum cum petiolo spithamæa, textura, forma, stipulatione &c. omnino ut in *I. multiflora*. *Pedunculi* 1-3 pollicares, apice bracteolis setaceis tot quot pedicellis minuti. *Pedicelli* $\frac{1}{2}$ -1'', graciles. *Flores* speciosi, violacei. *Labelium* $\frac{1}{2}$ - $\frac{2}{3}$ pollicare. *Capsula* et semina ut in *I. multiflora*.

26. *I. FLAVIDA* (*H. f. & T.*). Caule gracili erecto, foliis ($1\frac{1}{2}$ -2'') oppositis ternisque longe petiolatis ovato-lanceolatis utrinque angustatis glaberrimis multinerviis subserratis, pedunculis axillaribus solitariis petiolo longioribus erectis 2-4-floris, floribus flavis subumbellatis, bracteis recurvis, sepalis parvis ovatis oblongisve acuminatis, labello saccato subcampanulato v. ventricoso calcare hamato terminato, vexillo dorso gibbo.—*An Wall. Cat.* 4763 A (sub *trilobata*)?

I. fruticosa, *Lesch, Wall. Cat.* 4762 (*sphalm.*).—*Impatiens* e *Pundua* fl. flavo, *Wall. Herb. in Linn. Soc.* sine numero.

Hab. Sylvis tropicis Bengalæ orientalis, Silhet! *Wallich*; Luckipore in Silchar! *J. D. H. & T. T.* (fl. Nov.). (v.v.)

Herba 2-3-pedalis, glaberrima. *Folia* inferiora opposita, superiora sæpius terna. *Pedunculi* sæpe oppositi, stricti, 1-2''; *pedicellis* $\frac{1}{2}$ -1''. *Flores* $1\frac{1}{2}$ ''; sepalis viridibus, labello flavo; alis flavidis apices versus purpurascensibus. *Capsula* $\frac{3}{4}$ '' , sublanceolata, rostrata.

Some of *Wallich's* specimens of this in *Herbs.* *Hooker*, *Lindley*, and *Henslow*, have the ticket of *I. fruticosa* (e *Nilgherry*) attached to them; other specimens are, I think, catalogued under *I. trilobata* (4763 A).

27. *I. ROYLEI* (*Walpers, Repert.* i. 475). Elata, robusta, ramosa, glaberrima, foliis (2-4'') petiolatis stipulatis oppositis verticillatisque rarius alternis ovato- v. oblongo-lanceolatis lineari-oblongisve grosse serratis basi glanduloso-setigeris, pedunculis versus apices ramulorum elongatis erectis robustis multifloris, pedicellis subumbellatis breviusculis, sepalis majusculis late oblique ovatis acuminatis, labello longe saccato ventricoso lato basi obtuso rarius conico in calcar breve abrupte angustato, vexillo bilobo, alis amplis, capsula clavata.

I. glandulifera, Royle, *Ill.* 157. t. 28. f. 2, *Lindl. Bot. Reg.* 1840, t. 22; *Hook. Bot. Mag.* 4020.

Var. *a*. Foliis crenato-serratis glanduliferis.

Var. *β*, *moschata*. Foliis subverticillatis alternisque, grosse serratis minus glandulosis.—*I. moschata*, Edgw. in Linn. Trans. xx. 38.

Var. *γ*, *candida*. Foliis supremis oppositis verticillatisque, floribus albis roseo maculatis.—*I. candida*, Lindl. in Bot. Reg. n.s. xiii. Misc. 85. n. 204.

Var. *δ*, *macrochila*. Foliis supremis alternis, petalorum lateralium lobis posticis elongatis.—*I. macrochila*, Lindl. Bot. Reg. 18, t. 8.

Hab. In Himalaya temperata occidentali frequentissima, a Nepal?, *Wallich*; ad Marri! alt. 6000–8000 ped., *Fleming* (fl. Jul.–Sept.). (v.v.)

Species insignis, gigantea, 4–10-pedalis, ramosa, caulibus basi crassitie pollicis, fistulosis?. *Folia* valde varia, longe v. brevius petiolata, basi rotundata v. angustata, grosse serrata; caule ad basin petioli glandulis crassis pedicellatis aucto. *Pedunculi* robusti, stricti, erecti, 2–5'', bracteis ovato-lanceolatis acuminatis. *Sepala* lateralia 2–4½'', viridia, subpersistentia. *Flores* late rubro-purpurei, ¾–1½ unc. lati; calcare brevi incurvo. *Capsula* ½–¾'', clavata. *Semina* edulia, magna, late obovoidea, testa opaca subrugosa.

This fine species approaches very closely indeed to some states of *I. longicornu*, Wall., *I. sulcata*, Wall. (*gigantea*, Edgw.), *I. Thomsoni*, and other allied species or varieties of Section H, but may always be known by the shortly clavate capsule. This short clavate capsule is indeed the only character by which many dried specimens can be distinguished from *I. longicornu* and others of that section.

The *I. moschata* of Edgeworth may be a different species, as Mr. Edgeworth suggests, but I cannot distinguish it by herbarium specimens. It is said to differ from *I. Roylei* in its musky odour, in its habit, and in the leaves being more deeply serrate; the latter appears to be a very variable character, the upper leaves being more deeply cut than the lower in both forms.

28. *I. THOMSONI* (*H. f.*). Herbacea, glaberrima, foliis infimis oppositis superioribus alternis verticillatisque ovato-acuminatis petiolatis glanduloso-stipulatis grosse duplicato-serratis, pedunculis aggregatis elongatis erectis pedicellatis subumbellatis racemosisque, bracteolis subulato-lanceolatis, floribus ½–¾'' long. sordide lilacinis maculatis, sepalis parvis ovato-lanceolatis, labello conice saccato in calcar breve rectum attenuato, capsulis inclinatis ¾'' long. lineari clavatis.

Hab. Himalaya temperata subalpina, Sikkim, alt. 12,000 ped.! *J. D. H.*; Kumaon et Garwhal, 12,000! *St. & W.* (6, 7, 8); Piti! et Kunawur, 9000–10,000 ped.! *T. T.* (fl. temp. pluv.). (v.v.)

Herba robusta, pedalis et ultra, *I. sulcata* var. *β* simillima, sed omnibus partibus minor, calcare breviori recto conico, sepalis angustioribus capsulisque brevioribus.

This puzzling plant occurs throughout the Himalaya, on the edge of the Tibetan climate, and in subalpine districts. It differs from *I.*

tuberculata in the longer spur and even capsules, from small states of *I. Roylei* in the small size, narrower capsules, subulate bracts and conical spur; from *I. longicornu* and its allies by the capsules being shorter, and forming an angle with the pedicel.

29. *I. SULCATA* (Wall. Cat. 4764). Caulibus erectis crassis sulcatis, foliis inflorescentia et floribus fere *I. Roylei*, sed capsula nutante elongata subæquali et angustiore.

I. gigantea, Edgw. ! in Linn. Trans. xx. 38.

β , *minor*. Sepalo postico conico in calcar rectum sensim attenuato.

Hab. Himalaya temperata tota, alt. 7000–12,000 ped., Sikkim ! *J. H.* ; Nepal ! *Wallich* ; Kumaon ! *Strachey & Wint.* ; Simla ! *T. T.*, &c. ; Kunawur ! *Grant* ; Marri ! *Fleming* (fl. temp. pluv.) (v.v.) ; β , Kuna-wur ! *Grant*, *T. T.*

Herba gigantea ; in Himalaya occidentali altit. 15 ped. et caule 5-poll. diamet. *fid. Edgeworth* attingit !—in Sikkim 5–7 pedalis.—*Caulis* fistulosus.

A very tall, coarse-growing species with furrowed stems, in the dried state so like *I. Roylei*, that it is impossible to distinguish them, except by the long capsule of this. My Sikkim specimens have often four lateral sepals. This appears to pass by numerous insensible gradations into *I. longicornu* and others. *I. Thomsoni* may be only a serrate state of it, connected by the var. β *minor* of *I. sulcata*. The inclined shorter capsules, which form an angle with the pedicel, best distinguish this from *longicornu*, &c. The seeds are large and eatable, as in *I. Roylei*.

30. *I. AMPLEXICAULIS* (Edgew. Linn. Trans. xx. 37). Glaberrima, ramosa, foliis (2–4") inferioribus oppositis sessilibus oblongo-lanceolatis acuminatis crenato-serratis superioribus alternis amplexicaulibus ovato-lanceolatis, pedunculis axillaribus multifloris, sepalis ovatis acutis, labello late saccato calcare brevi, vexillo orbiculari bilobo, alis bilobis, capsula lineari.

Hab. Himalaya occidentali temperata, Kumaon, alt. 12,000 ped. ! *Str. & Wint.* ; Simla, 6000–8000 ped. ! *Comta. Dalhousie*, &c. ; Kulu ! *Edgeworth* (fl. Sept.–Oct.) (v.v.)

Affinis *I. Roylei*, sed facile distinguenda foliis breve petiolatis basi latius superioribus basi profunde cordato-amplexicaulibus, pedunculis brevioribus, floribus paucioribus et minoribus non confertis et capsula angusta non clavata.—*Caulis* 3–4 pedalis, 4-angularis, *Edgw.*

31. *I. VERTICILLATA* (*Wight in Madr. Journ. Sc.* v. p. 15). Glaberrima, foliis oppositis verticillatisque (rarissime alternis) breve petiolatis lanceolatis utrinque acuminatis argute serratis serraturis infimis setigeris stipulis subulatis, pedunculis elongatis erectis subumbellatim 3–5-floris, pedicellis gracilibus, sepalis majusculis oblongo-lanceolatis, vexillo concavo breviter cornuto, labello cymbiformi calcare elongato gracillimo.

Hab. Mont. Malabar ad Shevagerry et Bolimputa! *Wight*; *Cochin*!
Johnstone (fl. Aug.—Nov.).

Spithamæa ad 2-pedalem. *Caules* crassiusculi, simplices v. ramosi, ad nodos incrassati. *Stipulae* porrectæ, spiniformes. *Folia* 2–4" long. $\frac{1}{2}$ – $\frac{1}{2}$ " lat., subcarnosula, subtus pallida. *Pedunculi* stricti, foliis breviores v. longiores, interdum validi et 3" long. *Bractea* parvæ, subulata v. late ovata. *Pedicelli* $\frac{1}{2}$ –1", suberecti. *Flores* majusculi, $\frac{1}{4}$ – $\frac{3}{4}$ " diam.; calcar $\frac{3}{4}$ –1" long. recto v. lente curvo. *Capsula* imatura breviuscula, glabra.

32. *I. CIRCÆOIDES* (*Wall. Cat.* 4772). Parvula, simplex, glabra, foliis paucis oppositis gracile petiolatis ovatis acutis subserratis basin versus ciliatis subtus glaucis, pedunculis solitariis gracilibus apices versus racemum brevem gerentibus, floribus parvis, sepalis orbiculatis acuminatis, vexillo parvo concavo, labello parvo concavo breviter conice calcarato, alis (pro flore) maximis.

Hab. Tavoy! *Wallich*; Pegu! *McLelland*.

Caulis simplex, *spithamæus*, gracilis. *Folia* 2", petiolo gracili, membranacea. *Pedunculi* axillares, 1–1 $\frac{1}{2}$ ". *Bractea* parvæ, late ovata, concavæ. *Pedicelli* $\frac{1}{2}$ ". *Flores* albi? *Sepala* viridia. *Alarum* lobus dependens $\frac{1}{3}$ " long., labello et vexillo multoties major. *Capsula* brevis?

Nearly allied to *I. Tavoyana*, Benth., but the spur is very short, and the leaves are mostly opposite.

33. *I. GOUGHII* (*Wight, Ill.* i. 160; *Icones*, t. 1603). Pusilla, caule debili gracili laxo ramoso, foliis plerumque oppositis pollicaribus petiolatis elliptico v. oblongo-ovatis obtusis grosse crenatis, pedunculis gracilibus foliis longioribus apice subumbellatim 4–6-floris, pedicellis capillaceis, bracteis caducis, floribus minimis, calcar flore æquilongo, capsulis ellipticis utrinque acuminatis.

Hab. Mont. Malabaræ prope Pycarra! *Gough*; Maisor! *Lobb*.

Caulis 6–18". *Folia* interdum omnia alterna, pallide viridia, basi cuneata, in petiolum non angustata. *Flores* rosei v. albi. *Vexillum* obcordatum acuminatum; labello cymbiformi, calcar brevi recto; alis bilobis, lobis retusis. *Capsula* $\frac{1}{2}$ unc. longa, oligosperma. *Semina* minima.

Wight remarks that this is a slender, diffuse-growing species, seeking support of adjacent plants, and then attaining 18 inches in length. The flowers are shortly racemose or subumbellate.

D. UNIFLORE (vide p. 113).

Vide *I. Leschenaultii*, *latifolia* (β *bipartita*) in § C.—In *I. spirifera* flores rarissime bini in eodem pedicello. Vide *I. puberula*, *arguta*, et alia in F.

34. *I. BALSAMINA* (*Linn. Sp. Pl.*). Glabrata v. pubescens, caule simpliciusculo, v. ramoso, foliis petiolatis anguste lanceolatis utrinque

acuminatis grosse serratis, petiolo glandulifero, sepalis minutis late ovatis, labello pubescenti cymbiformi calcare tenui elongato, vexillo alisque amplis roseis, capsula brevi dense tomentosa.

I. coccinea, Sims, *Bot. Mag.* 1256.—*I. cornuta*, Linn. *Sp. Pl.* 1328.—

I. longifolia, Wight in Wall. *Cat.* 4734.—*I. arcuata*, Wall. *Cat.* 4735! *Balsamina Hortensis*, D.C., &c.

α , *vulgaris*. Elata, foliis late lanceolatis, floribus magnis, calcare breviusculo.

β , *longifolia*, Wt. & Arn. *Prodr.* i. 136. Foliis anguste lanceolatis, floribus mediocribus, calcare elongato gracili.

γ , *arcuata*. Diffuse ramosa, foliis parvis anguste lanceolatis, floribus parvis, calcare elongato.

δ , *macrantha*. Humilis, 4-pollicaris, foliis ovato-lanceolatis, floribus magnis, calcare brevi.

ϵ , *micrantha*. Humilis, caule simplici, foliis parvis ovato-lanceolatis, floribus parvis, calcare gracili elongato.

ζ , *rosea*. Caule simpliciusculo elongato, foliis lineari-lanceolatis, floribus inter minores, calcare brevi incurvo.—*I. rosea*, Lindl. *Bot. Reg. Misc.* 1841, p. 6. no. 22, et vol. xxvii. t. 27.

Hab. Var α et β per totam Indiam tropicam locis humidis a Ceylon! et Malacca! ad Punjab! frequens; var. γ , δ , ϵ in Malabar! Kurg! &c. (fl. Aug.). (v.v.)

Dist. Ins. Malayanae! et China!

Planta vulgarissima, valde protea. Omnes varietates variant foliis floribusque glabratibus pubescenti-tomentosisve.

35. *I. SCABRIUSCULA* (Heyne in Roxb. *Flor. Ind.* ed. Wall. ii. 464).

Humilis, erecta, ramosa, pubescenti-tomentosa, foliis $\frac{1}{2}$ –1" paucis breve petiolatis lanceolatis acuminatis serratis, pedicellis brevibus, sepalis minimis, labello cymbiformi tomentoso, calcare 0.—Wall. *Cat.* 4729!; Arn. in Hook. *Comp. Bot. Mag.* ii. 322.

Hab. Mont. tropicis Malabaricae! Heyne, *Hb. Stocks.*

Dist. China (fid. Wt. & Arn.).

I. Balsaminæ proxima sed multo minor, foliis latioribus labelloque ecalcarato.

36. *I. GLANDULIFERA* (Arn. in Hook. *Comp. Bot. Mag.* ii. 322). Suffruticosa,

glabra, ramis crassis apices versus foliosis, foliis maximis (6–10") longe petiolatis amplis ovatis utrinque acuminatis setuloso-serrulatis, petiolo glandulifero, pedicellis numerosis axillaribus fasciculatis, sepalis minimis subulatis, labello piloso longe saccato sacco late conico calcare brevi incurvo apice incrassato, vexillo piloso late orbiculato bilobo dorso rostrato, alis exsertis bipartitis lobo laterali brevi rotundato terminali late semiobovato pendulo.

I. cornigera, Hook. *Bot. Mag.* 4623, non Arn.

Hab. Sylvis tropicis Ceylonicae! Walker, &c.

Species insignis, *I. macrophyllæ* habitu foliisque simillima, sed plerumque glabra. Flores pallide roseo-purpurei, sacco stramineo.

37. *I. MACROPHYLLA* (*Gardner in Herb. Hook. and Bot. Mag.* 4662). Suffruticosa, glabra, ramis crassis apices versus foliosis, foliis *I. glanduliferæ* sed sæpissime pubescenti-pilosis, pedicellis brevibus fasciculatis, floribus glaberrimis, sepalis minimis, labello acuminato breviter saccato calcare brevi minimo, vexillo oblongo dorso alato apice acuminato rostrato, alis minimis bipartitis inclusis.

I. glandulifera, var. ?, *Arn. in Comp. Bot. Mag.* ii. 323.

Hab. Sylvis montosis subtropicis Ceyloniæ, alt. 5000–7000 ped. ! *Walker, &c.*

Frutex 10–12 pedalis (fid. *Walker*), foliis interdum 16". *I. glandulifera* affinis, sed differt floribus multo minoribus, glaberrimis, labello aurantiaco, vexillo angusto apice rostrato coccineo, alis minimis inclusis.

38. *I. REPENS* (*Moon Cat.*). Glaberrima, caulibus prostratis basi repentibus vage diffuse ramosis, foliis longe petiolatis ovato cordatis v. reniformi-rotundatis acutis, pedicellis foliis multo longioribus ebracteolatis, sepalis parvis oblongo-lanceolatis, labello late saccato subconico calcare brevi incurvo, vexillo latiore quam longo suborbiculato dorso corniculato, alis alte bilobis lobis brevibus latis.—*Wight, Ill.* 160. t. 61; *Hook. Bot. Mag.* 74. t. 4404.

Hab. Sylvis montosis tropicis Ceyloniæ, alt. 4000 ped. ! *Walker, &c.*

Caules crassi, carnosi, hic illic radicanes. *Folia* $\frac{1}{2}$ –1" lata, petiolo breviora, interdum obscure subserrata. *Pedicelli* solitarii, pollicares. *Flores* aurei, speciosi, 1" longi; labello et vexillo pubescente. *Ovarium* hirsutum.

39. *I. LEPTOPODA* (*Arn. in Hook. Comp. Bot. Mag.* ii. 321). Erecta, ramosa, glaberrima, caulibus gracilibus, foliis longe petiolatis (1–3") lanceolatis ovato-lanceolatisve acuminatis crebre crenato-serratis petioloque interdum glanduloso setosis, pedicellis ebracteolatis axillaribus subsolitariis gracilibus strictis, floribus parvis, sepalis parvis oblongo-lanceolatis, labello cymbiformi calcare gracili elongato (v. abbreviato), vexillo obcordato dorso cornuto, alis horizontaliter patentibus (? *I. latifolia*, *Wall. Cat.* 4737, in *Herb. Henslow.*). An var. *I. latifolia*, L. ?

Var. β , *brevicornu*. Calcare abbreviato flore brevior.—*I. brevicornu*, *Arn. l. c.*

Var. γ , *gibbosa*. Sepalo postico cymbiformi subsaccato calcare nullo.—*Arn. l. c.*

Hab. Sylvis montosis subtropicis Ceyloniæ ! alt. 5000–8000 ped., *Walker &c.* (fl. Sept.–Nov.).

Herba 1–3-pedalis. *Caules* basi interdum suffruticulosi. *Folia* submembranacea, basi attenuata, in var. *brevicornu* interdum 4-pollicaria. *Flores* $\frac{1}{3}$ – $\frac{1}{2}$ " lati, latiores quam longi, ob petala lateralia horizontaliter patentia. *Capsula* $\frac{1}{3}$ ", glabra v. puberula.

Thwaites describes this as being very common and variable, and points out its close affinity with *I. Leschenaultii*, in all my specimens of which the leaves are more or less opposite.

40. *I. TRUNCATA* (*Thw. En. p. 66*). Debilis, subramosa, caulibus superne foliis floribusque sparse puberulis glabrativse, foliis (1-1½") petiolatis ovatis ovato-lanceolatisve acuminatis setuloso-serratis membranaceis, petiolo sparse glanduloso, pedicellis 1-3 bracteolatis gracilibus, floribus parvis, sepalis minutis subulatis, labello saccato sacco conico, calcare breve cylindrico truncato, alis inæqualiter bilobis.

Hab. In sylvis subtropicis Ceyloniæ alt. 4000-6000 ped! *G. Thomson, Thwaites* (fl. Oct.).

Affinis *I. leptopodæ*, sed humilior et ut videtur habitu diversa, foliis junioribus petiolis pedunculisque hispidulis, floribusque pubescenti-pilosis.

Thwaites compares this with Wight's figure of *I. inconspicua*, Bth., which, however, differs much in the opposite leaves, form of the spurless flowers, and longer, more slender pedicels.

41. *I. PENDULA* (*Heyne in Wall. Cat. 4744!*). Erecta, ramosa, ramis linea pubescenti cum petiolis continua, foliis (½-½") breve petiolatis ellipticis subcordatis v. ovato-ellipticis acutis remote serratis puberulis, pedicellis ebracteolatis solitariis pilosis fructiferis deflexis, floribus minutis glabris, sepalis labello concavo non calcarato, vexillo cornuto, capsula parva ventricosa.—*Wight & Arn. Prodr. 137* (descr. secus *Wt. & Arn. Prodr.*).

Hab. Malabar vel Maisor, *Heyne*.

Affinis *I. scabriusculæ* fid. cl. *Wt. & Arn.* sed differt floribus minutis glabris.

42. *I. MYSORENSIS* (*Roth. Nov. Sp. 164*). Caule simplici gracili erecto, foliis alternis lanceolatis, utrinque acuminatis glabris, pedicellis binis axillaribus filiformibus folio ½ brevioribus, floribus parvis, calcare recto brevi, capsula dense pubescente.—*Roth. Nov. Sp. 164; Wall. Cat. 4743; Wight, Cat. 979* (descript. ex *Wight & Arn. p. 137*).

Hab. Maisor, *Heyne, Wight*.

Of this species I know nothing, except from the specimens in the Linnean Society, and the description of Wight and Arnott rendered above. It would appear to be very near *I. pendula*, but differs in the spurred flowers and pubescent capsules.

43. *I. MUNRONII* (*Wight, l. c. 1049*). Erecta ramosa tota pubescenti-pilosa, caule lignoso, foliis (1-2") versus apices ramorum longe petiolatis ovatis ovato-lanceolatisve utrinque acuminatis subserratis, pedicellis ebracteolatis solitariis, sepalis hirsutis magnis late ovatis lanceolatisve acuminatis, labello in calcar conicum hamatum sensim attenuato, vexillo orbiculari dorso alato, alis brevibus obovatis bifidis.

Hab. Mont. tropicis Malabariæ, sylvis ad Sisparah! *Wight, Gardner, &c.* (fl. Jan.).

Suffruticulus pedalis, ramis patentibus, siccis cicatricibus ad basin foliorum delapsorum nodulosus. Folia utrinque pubescenti-pilosa. Pedicelli unciales. Flores pollicares, purpurei. Ovarium pilosum.

44. *I. DASYSERMA* (*Wight in Madr. Journ. Sc. v. p. 7. f. 2, Ic. 742*). Herbacea caule simpliciusculo, foliis (2-4") longe petiolatis ovato-lanceolatis utrinque acuminatis crenato-serratis supra pilosis subtus glaberrimis, pedicellis ebracteolatis subsolitariis, floribus inter minores, sepalis minutis ovatis acuminatis, labello cymbiformi calcare gracili incurvo, vexillo obcordato, alis profunde bifidis horizontaliter patentibus, capsula glaberrima, seminibus pilosis.
- Hab.* Mont. tropicis Malabariæ sylvis prope Courtallam, *Wight* (fl. Aug., Sept.).
- Glaberrima 1-2 pedalis, flaccida; ramis suboppositis. *Folia* petiolata, petiolo et basi folii interdum glandulis paucis stipitatis ornato, 2-3" longa. *Pedicelli* pollicares, graciles. *Flores* sub $\frac{1}{2}$ " lati. *Calcar* gracile interdum pilosum. *Capsula* oblique turgida, rostrata.
45. *I. FLACCIDA* (*Arn. in Hook. Comp. Bot. Mag. 322*). Herbacea, glaberrima, laxe ramosa, foliis (2-4") petiolatis ovatis ovato v. elliptico-lanceolatis crenulatis basin versus setoso-glandulosis utrinque acuminatis, pedicellis ebracteolatis solitariis binisve elongatis erectis, flore majusculo, sepalis minutis linearibus, labelli limbo parvo calcare gracillimo elongato, vexillo obcordato, alis bipartitis horizontaliter patentibus.
- I. latifolia*, *L.*, var.? an *I. latifolia*, *Wall. Cat. 4737 A?* et *I. lucida*, 4738 in *Herb. Henslow*.
- β . Foliis capsulaque pilosulis.
- Hab.* Mont. tropicis Ceyloniæ alt. 4000-6000 ped. ! *Walker, &c.* ; Malabariæ ! *Gardner, &c.* (fl. Oct.-Dec.). (v.v.)
- Var. β . Peninsula Malayana ad Moulmein ! *Lobb*.
- Herbacea* 1-2 pedalis, tota glaberrima, nisi var. β . *Folia* plerumque ampla, membranacea, petiolo setoso v. glanduloso v. nudo, *Pedicelli* graciles, 1-2". *Flores* magnitudine varii, $\frac{3}{4}$ -1 $\frac{1}{2}$ " lati, purpurei, violacei v. rosei, speciosi; alis profunde bilobis, lobis obovato-cordatis in var. β apice bilobis. *Capsula* 2 $\frac{3}{4}$ pollicaris, turgida, utrinque attenuate rostrata, polysperma. *Semina* pilosula.
46. *I. PULCHERRIMA* (*Dalzell in Hook. Journ. Bot. 1850, vol. ii. 37*). Glabra, caule herbaceo simpliciusculo, foliis (3-5") longiuscule petiolatis membranaceis ovato-lanceolatis utrinque acuminatis supra pilosulis basin versus et petiolo setoso-glandulosis, pedicellis ebracteolatis 2-3-nis erectis, floribus maximis, sepalis minutis subulatis, labelli limbo parvo subcymbiforme in calcar elongatum gracile attenuato, vexillo orbiculari bifido dorso rostrato, alis amplis bipartitis lobis obovatis apice bilobis.—*Hook. Bot. Mag. 4615*.
- Hab.* Mont. Concan tropicis ! *Dalzell* (fl. Aug.).
- Species nobilis, *I. flaccide* affinis, sed omnibus partibus duplo major. *Flores* 2-2 $\frac{1}{2}$ " longi, pallide purpurei. *Pedicelli fructiferi* erecti. *Capsula* glaberrima, cernua; semina pauca, opaca, subrugosa v. tuberculata, glabra.

47. *I. HENSLOVIANA* (*Arn. in Hook. Comp. Bot. Mag.* ii. 322). Caule suffruticoso crasso noduloso, foliis hirsutis pubescentibus glabratissime lanceolatis ovato-lanceolatisque utrinque acuminatis serratis basi v. petiolo glanduloso, pedicellis ebracteolatis subsolitariis elongatis erectis, floribus magnis, sepalis amplis late ovatis acuminatis mucronatis, labelli limbo parvo calcare elongato gracili incurvo, vexillo obcuneato v. orbiculari bilobo, alis horizontaliter patentibus bipartitis segmentis obovatis bilobis.

I. albida, *Wight, Ic.* 743, et in *Madr. Journ. Science*, v. p. 7. f. 1.

Hab. Mont. tropicis Ceyloniæ! alt. 4000–6000 ped., *Walker, &c.*, et Malabariæ, alt. 2000–3000 ped.! *Wight* (fl. Sept.–Oct.).

Species pulcherrima, sæpissime tota pubescenti-pilosa, sed interdum glabrata v. imo glaberrima, ob caules crassos, pedicellos elongatos, flores magnos et sepala lateraliter ampla facile dignoscenda. *Capsula* glaberrima v. pilosa.

48. *I. SPIRIFER* (*H. f. & T.*). Glaberrima v. pilosula, foliis longe petiolatis ovato-lanceolatis caudato-acuminatis grosse crenatis in petiolum angustatis supremis subverticillatis sessilibus basi glandulis stipulatis, pedicellis subterminalibus erectis solitariis v. rarius binis basi carinatis, floribus $1\frac{1}{2}$ poll. purpureis fauce flavis sepalis amplis oblique ovato-cordatis cuspidatis, labello saccato subcampanulato in calcar breviusculum spiraliter tortum sensim angustato, capsula lineari-lanceolata.

Hab. Sylvis temperatis subtropicisque Himalayæ orientalis Sikkim, alt. 4000–7000 ped.! *J. D. H.* (fl. Oct.–Dec.). (v.v.)

Species insignis, 2–4-pedalis, inter hanc sectionem et § E media, ob pedicellos cum binis basi connatos. *Folia* 1–3'', interdum puberula. *Pedicelli* pollicares. *Labellum* pallide roseum, rubro-lineatum. *Vexillum* orbiculatum, apiculatum, dorso cornutum; alarum segmentis late purpureis, posticis lineari-oblongis pendulis. *Capsula* pollicaris. *Semina* parva, orbicularia, puberula.

A very beautiful species, readily distinguished by the large flowers, short, spirally-incurved spur, long, deeply-conical, posticous sepal, and long capsules. It is very closely allied to *I. arguta*, H. f. & T., but differs in the almost invariably solitary flowers, and in the absence of the curious twisted bracteoles.

49. *I. CAPILLIPES* (*H. f. & T.*). Parvula, diffuse ramosa, glaberrima, caule gracillimo, foliis 1–2'' petiolatis lineari-lanceolatis lanceolatisve grosse crenatis nitidis flaccidis eglandulosis, pedicellis solitariis v. binis capillaribus 1-floris, floribus minutis, sepalis falcatis, labello saccato sacco ventricoso cylindraceo calcare minimo incurvo, vexillo lineari oblongo elongato, alarum lobis acuminatis.

Hab. Peninsula Malayana ad Moulmein! *Lobb.*

Species valde singularis ob folia hyalina angusta, flaccida grosse crenata, pedicellos capillares, flores minutos vexillumque elongatum. *Caules*

4-6". *Petioles* gracillimi $\frac{1}{2}$ -1 pollicares. *Pedicelli* petiolos subæquantes. *Flores* albi? $\frac{1}{3}$ " lati. *Capsula* late elliptica, basi angustata, apice acuminata, similis *I. racemuliferæ*.

E. LATERIFLORÆ (vide p. 113).

§ a. *Capsula* anguste linearis elongata (vide *I. spirifer* in § D).

50. *I. SERRATA* (*Benth. in Wall. Cat.* 4771!). Glabra, caule erecto simpliciusculo v. basi ramoso, foliis (1-3 poll.) subsessilibus v. petiolo alato ovato-lanceolatis acuminatis argute serratis eglandulosis petiolo basi glandula globosa stipulata v. nuda, pedicellis gracillimis versus medium bifidis 2-floris, bracteis setaceis dissitis, floribus $\frac{2}{3}$ -1 $\frac{1}{2}$ " albidis flavisve rubro-maculatis, sepalis parvis falcatis, calcare abrupte incurvo flore longiore, capsula anguste lineari.

Hab. Umbrosis Himalayæ temperatæ centralis et orientalis, Nepal! *Wallich*; Sikkim 8000-10,000 ped.! *J. D. H.* (fl. Jul.-Sept.). (v.v.)

Caules graciles, 1-3 pedales. *Folia* membranacea, glabra. *Flores* plani, labello oblique conice saccato, in calcar attenuato; vexillo oblongo subunguiculato, alis unguiculatis lobo postico falcato. *Capsula* 1-1 $\frac{1}{2}$ " angustissima. *Semina* numerosa, 1-seriata, lineari-obovata, grosse tuberculata.

A smaller, more delicate and graceful species than is *I. scabrida*, D.C., with very differently shaped spur and petals.

51. *I. SCABRIDA* (D.C. *Prodr.* i. 687, *Wall. Cat.* 4769 b; *Edgew. in Wight, l.c.* t. 323). Caule simpliciusculo robusto foliisque pubescenti-pilosis glabrativis, foliis ovatis lanceolatis ovato-lanceolatisve acuminatis in petiolum angustatis grosse serratis eglandulosis petiolo basi glandulis 2 grossis stipulato, pedunculis foliis multo brevioribus 2-6-floris, bracteis setaceis dissitis, floribus aureis, sepalis amplis ovato-cordatis acuminatis, labello late conico calcare incurvo, vexillo dorso cornuto, capsulis lineari-elongatis.—*Wall. Cat.* 4769!

I. tricornis, *Lindl. Bot. Reg.* xxvi. 1840, t. 9; *Hook. Bot. Mag.* 4051.—*I. punctata*, *Wall. MSS.*—*I. cristata*, *Wall. in Roxb. Fl. Ind.* ii. 456.—*I. calycina*, *Wall. l.c.* p. 463.—*I. Hamiltoniana*, *Don, Prodr.* 204.

Hab. Umbrosis Himalayæ temperatæ, Bhotan! *Griffith*; Nepal! *Wallich*; Kumaon! *Str. & Wint.*; Simla! *Comta Dalhousie*, &c.; Kumaon! *Grant*; Sikkim, *fid. Icon. Cathcart* (fl. temp. pluv.). (v.v.)
Species 3-5 pedalis, plerumque robusta, plus minusve pubescens, sed interdum glabra v. glaberrima. *Folia* petiolata, v. subsessilia. *Pedunculi* interdum paniculati. *Flores* 1" longi, speciosi, aurei, punctis rubris consperse. *Capsula* 1-1 $\frac{3}{4}$ " longa, glabra v. puberula. *Semina* 1-seriata, oblonga, vix tuberculata.

The *I. calycina*, Wall., seems from specimens in Lindley's Herbarium to be the same as his *cristata*, and which is undoubtedly the *I. scabrida* of De Candolle. I have no Sikkim specimens, but a drawing from

Cathcart's collection of what appears to be a very pale-flowered variety of it, and which has four lateral sepals.

52. *I. ARGUTA* (*H. f. & T.*). Glaberrima, caule gracili ramoso, foliis 2-2½" breve petiolatis v. petiolo alato elliptico-lanceolatis utrinque longe acuminatis argute serratis dentatisve basi setosis superioribus sæpe petiolo glanduligero sed basi glandulis non stipulato, pedunculo brevissimo 1-2-floro, bracteis setaceis elongatis tortis, pedicellis elongatis, floribus magnis cæruleis lilacinisve, sepalis oblique ovatis cuspidato-acuminatis majusculis, labello longe saccato late infundibuliformi v. campanulato calcare breviusculo hamato, vexillo dorso subrostrato. *Hab.* Umbrosis Himalayæ orientalis temperatæ et tropicæ; Sikkim, alt. 5000-7000 ped.! *J. D. H.*; Mont. Khasiæ, alt. 3000-6000 ped.! *Lobb, &c.* (fl. Jun.-Oct.). (v.v.)

Species insignis 1-4 pedalis, *I. spirifer* affinis et similis, sed caules robustiores; folia majora, argute dentata v. serrata, basi ciliata (rarius nuda), petiolus sæpissime glandulosus, pedunculis brevissimis, bifloris, bracteæ elongatæ tortæ, et calcar hamatum non circinatum.—*Capsula* linearis, pollicaris. *Semina* pauca, orbicularia, opaca, granulata. *Folia* inferiora sæpius non glandulosa.

The long, subulate, twisted bracteoles of this species are quite peculiar to it; in other respects it resembles *I. spirifer*, &c. It is very common in the Khasia mountains, and is probably distributed amongst Wallich's plants, though I have failed to recognize it amongst the Linnean Society's collections, Henslow's, Bentham's, or those of Kew. In some of my Sikkim specimens there are four lateral sepals, as there are also in that figured by Cathcart's artists; in others only two.

b. *Capsula* brevis v. ignota.

53. *I. DISCOLOR* (*De Prodr.* i. 687; *Wall. Cat.* 4767). Caule erecto subramoso, foliis petiolatis 1-2" ovatis acuminatis eglandulosis grosse crenato-serratis supra pilosulis, pedicellis breviusculis 2-floris, bracteis parvis late ovatis dissitis, floribus magnis, sepalis parvis ovatis acuminatis labello longe saccato ventricosso calcare brevi incurvo v. circinato, vexillo dorso cornuto.

I. insignis, *Wall. Cat.* 4766, in part.

β. Glaberrima, foliis glaberrimis.

Hab. Himalaya centrali temperata, Nepal! *Wallich*; montibus Sikkim! et Khasia! umbrosis humidis (fl. Jul.-Sept.). (v.v.)

Caulis 3-5 pedalis. *Folia* membranacea, majora et latiora quam in *I. elegans* et *arguta*. *Pedunculi* gracillimi, foliis breviores, arcuati, iis *I. longipes* et *urticifolia* similes, sed breviores, pedicellis capillaceis. *Flores* 1½" longi. *Capsulæ* lineari-clavatæ, immaturæ?

I. urticæfoliæ simillima et forsitan ejus varietas, sed bracteæ breviores et folia apice non caudato-acuminata; calcare involuto non abrupte inflexo.

A very common and variable species, probably not distinct from *I. urticæfolia*, but the inflorescence is more lateral on the plant, and the leaves more uniform, and less crowded upwards.

54. *I. PORRECTA* (Wall. Cat. 7275!). Humilis, pedalis, glaberrima, caule simplici basi repente radicante dein erecta, foliis pollicaribus longe petiolatis ovato-ellipticis acutis serrulatis basin versus biglandulosis, pedunculis paucis folio brevioribus 2-3-floris, bracteis setaceis, floribus cum calcare $1\frac{1}{2}$ pollicaribus flavis, sepalis parvis ovatis acuminatis, labello subconice saccato calcare sensim attenuato apice hamato terminato.

Hab. Paludibus temperatis montibus Khasiæ! Wallich, prope Kalapane, alt. 5000-6000 ped., J. H. & T. T. (fl. Aug.). (v.v.)

Species pulchra, *I. discolor* proxime affinis. *Caules* vix pedales, crassiusculi, ad basin petiolorum non glandulosi. *Folia* pauca, 6-8", petiolo $\frac{3}{4}$ -1". *Pedunculi* et pedicelli graciles. *Flores* pro planta magni, pallide aurei v. straminei, lineis rubris pulchre striati, vexillo dorso rostrato. *Capsula*?

In habit and structure of the flower this is very closely allied to *I. bella*, but has always several flowers on one peduncle, &c. (see notes under *I. bella*).

55. *I. BELLA* (H. f. & T.). Sparse puberula, uniflora rarius biflora, caulibus simpliciusculis 3-5" basi repentibus dein erectis, foliis 1-1 $\frac{1}{2}$ " paucis membranaceis longe petiolatis late ovatis subacutis crenulatis, pedicello erecto gracili pubescente medio bracteolato 1-2 flore, sepalis majusculis oblongo-lanceolatis acuminatis, labello conice saccato in calcare gracili torto puberulo producto, vexillo late obovato dorso cornuto alis bilobis lobo basali auriculæformi terminali obovato elongato.

Hab. Paludibus temperatis mont. Khasiæ! Griffith, Lobb; prope Kalapane alt. 5000 ped., J. H. & T. T. (fl. Aug.). (v.v.)

Planta pulcherrima, membranacea, sicca flaccida. *Caules* basi simplices v. ramosi. *Petioli* $\frac{1}{2}$ -1", pubescentes, nudi v. parce setosi. *Folia* subtus nitida, basi interdum glanduligera v. setosa. *Flores* tenerrimi, $\frac{2}{3}$ " longi, aurantiaci v. aurei, petalis labelloque intus purpureo-striolatis. *Ovarium* glaberrimum, $\frac{1}{3}$ ". *Capsula* elliptico-lanceolata, pubescens. *Semina* subrotunda, papilloso-pubescentia.

Closely allied to *I. porrecta*, Wall., which has always several flowers on each peduncle, but the bracts are narrower, the whole plant more membranous and pubescent, the lateral sepals are larger, and the long lobe of the alæ much longer.

56. *I. RACEMULOSA* (Wall. Cat. 7274!). Glaberrima, caule crassiusculo simplici v. basi ramoso foliis 1-2" petiolatis ovatis lanceolatisve acuminatis obtuse serratis eglandulosis, racemis folio brevioribus 6-8-floris, pedunculo flexuoso, bracteis oblongis, pedicellis gracilibus,

floribus $\frac{3}{4}$ " intense violaceis, sepalis majusculis oblique ovatis acutis, labello cymbiformi calcare breviusculo incurvo flore æquilongo, vexillo parvo orbiculari, alarum lobo postico maximo late semiorbiculari obtuso.

Hab. Locis udosis apertis temperatis et subtropicis montibus Khasiæ; alt. 4000–5000 ped.! *Gomez, Lobb, J. H. & T. T.* (fl. Jun.–Oct.) (v.v.)

Species pulcherrima, nullæ arcte affinis. *Caulis* 6–8". *Folia* membranacea, petiolo basi glandulis non stipulato. *Racemi* pollicares, omnes laterales, horizontaliter patentes. *Calcar* $\frac{1}{2}$ – $\frac{3}{4}$ ", arcuatum ascendens, apice obtuso. *Capsula* $\frac{1}{3}$ ", brevis, obovato-lanceolata, basi breviter attenuata, apice acuta, oligosperma; dehiscens ab apice. *Semina* parva.

This has the fruit of many species in § B, and the racemose flower of the *Racemosa*.

57. *I. LATIFLORA* (*H. f. & T.*). Caule humili robusto puberulo, foliis petiolatis lanceolatis elliptico-lanceolatisve acuminatis crenato-serratis basi sæpissime glanduloso-setigeris subtus glaucis, pedunculis erectis crassis bis terve divisis simplicibusve, bracteis dissitis lanceolatis, floribus magnis roseis, sepalis amplis late ovatis acuminatis, labello cymbiformi in calcar rectum v. paulo curvum gracile elongatum abrupte contracto, vexillo dorso alato.

Hab. Umbrosis subtropicis montibus Khasia ad Nunklow, alt. 3000–4000 ped. *Lobb, J. H. & T. T.* et ? Himalaya orientali tropica Sikkim, alt. 2000–4000 ped., *J. H.* (fl. Oct.).

Statura habitu plerisque notis *I. pulchræ* proxima, sed differt floribus conspicuis, calcare gracili elongato, non cum sepalo conico sensim continuo. *Flos* $1\frac{1}{2}$ –2" latus, pallide roseus v. violaceus; calcare 1; petalis patentibus amplis; vexillo orbiculari bilobo, alis bipartitis lobis patentibus antico obovato retuso postico semiovato acuto. *Capsula* et semina immatura sed *I. pulchræ* ut videtur similia.

The Sikkim specimens look different; they have broader leaves and single smaller flowers on ebracteolate peduncles, but from drawings of both, taken on the spot, I am unable to point out any further differences between them.

58. *I. PULCHRA* (*H. f. & T.*). Humilis, glaberrima, caule simplici, foliis 2–3" crassiusculis petiolatis elliptico- v. anguste lanceolatis acuminatis serratis subtus pallidis, pedunculis erectis crassis bis terve divisis simplicibusve, bracteis dissitis lanceolatis, floribus magnis, sepalis amplis late ovatis acuminatis, labello magno late infundibuliformi in calcar conicum apice circinatum attenuato, alis amplis, vexillo dorso alato.

Var. β . Foliis latioribus ellipticis v. ovato-lanceolatis nervis numerosis.

Hab. Umbrosis montibus Khasia regione temperata et subtropica alt. 5000 ped.! *J. H. & T. T.*—Var. β . Nepalia maxime orientali, alt. 4000–5000 ped.! *J. H.* (fl. Sept.–Nov.) (v.v.)

Species pulcherrima, caule crassiusculo simplici v. diviso 4-8". *Folia* basi interdum setigera, nervis primariis in var. α paucis sub 8, margine parallelis, in var. β , 8-12, divergentibus. *Flos* $1\frac{1}{2}$ " longus, pallide roseus v. stramineus, rubro striatus. *Capsula* elliptico-oblonga, erecta, polysperma. *Semina* parva, lanata?—*Flores* interdum solitarii. *Capsulae* et *semina* *I. linearis*.

This is similar in some respects to *I. acuminata*, Benth., but differs in the flowers being considerably larger, not umbellate, and the leaves broader; the sepals and petals also are of a very different form.

59. *I. FRUTICOSA* (*D.C. Prodr.* i. 687; *Wall. Cat.* 4762!). *Caule* erecto robusto ramoso, foliis 3-5" longe petiolatis pubescentibus subsericeis glabratissime ovato lanceolatis acuminatis serratis crenatisve, petiolis 1-2 glandulosis tomentosis, pedunculis glabris folio brevioribus 3-5-floris, bracteis linearibus, pedicellis valde elongatis gracilibus, floribus amplis, sepalis magnis ovatis cuspidatis, labelli limbo brevi cymbiformi, calcare elongato curvo ascendente, vexillo late orbiculari bilobo, alis bipartitis segmentis divaricatis.—*Wight & Arn. Prodr.* 137; *Wight, Ic.* 966.

Hab. Sylvis montosis tropicis Malabariæ ad Kottergherry et Coonoor! (non alibi), *Wight* (fl. Aug. et Mart.).

Planta insignis, 8-pedalis, floribuunda. *Caulis* ad cicatrices nodosus. *Folia* interdum glabra, sæpissime appresse pubescentia, glandulis petioli sessilibus. *Flores* $1\frac{1}{2}$ " lati, calcare 2-unciali. *Pedunculi* plerumque in pedicellos 3, 2-4 unciales divisos, vel umbellam 2-4-florem gerens. *Capsula* magna, $\frac{3}{4}$ " longa, anguste elliptica, rostrata, polysperma. *Semina* glabra.

60. *I. JURPIA* (*Ham. Wall. Cat.* 4761!). Fruticosa, caule elato ramoso, foliis 3-5" petiolatis oblique ovatis ovato-lanceolatisve longe acuminatis serratis nervis subtus puberulis basi petioloque glandulosis, pedunculis axillaribus subterminalibusque gracilibus 2-4-floris, sepalis parvis, vexillo dorso cornuto, labello subconice saccato ventricoso in calcar subelongatum validum curvum contracto, alis labello miuoribus.

Var. β . Mutica, calcare et cornu vexilli brevioribus.

Hab. Sylvis umbrosis tropicis Himalayæ centralis et orientalis, Nepal! *Hamilton, &c.*; Sikkim, alt. 3000-5000 ped.! *Griffith, &c.* (fl. Sept.-Nov.). (v.v.)

Caulis 5-8 pedalis, ramosus, crassiusculus, basi sublignosus; ramulis pubescentibus glabrisve, plerumque flexuosis. *Folia* submembranacea, supra nitida, glaberrima v. pilosula, setis glanduligeris basin versus gracilibus. *Pedunculi* 3-5", glabri v. puberuli. *Bractea* caducæ. *Pedicelli* pollicares et ultra. *Flos* sordide albidus v. flavus v. aurantiacus, cum calcare rubro 2-pollicaris. *Sepala* acuta obcuneata dorso longe rostrata v. erostria. *Capsula* anguste lineari-oblonga, pollicaris, glaberrima. *Semina* pauca, 4-6 apicem versus capsulae, parva, opaca, suborbicularia, tuberculata.

61. *I. PUBERULA* (*De Prodr.* i. 687; *Wall. Pl. As. Rar.* ii. 193; *Cat.* 4767 A). Plus minusve pubescens v. glabrata, caule elongato simplici v. ramoso, foliis 1-5" in petiolum attenuatis elliptico- v. ovato-lanceolatis utrinque acuminatis crenatis eglandulosis, pedicellis bracteolatis 1-4-floris solitariis v. binis gracilibus erectis axillaribus subterminalibusque floribusque violaceis pubescentibus, sepalis majusculis ovatis acuminatis, labelli limbo cymbiformi, calcare longo gracili curvo, alis patentibus, capsula lineari.

I. mollis, *Wall. in Roxb. Fl. Ind.* ii. 461.—*I. hispidula*, *Bth. Wall. Cat.* 4740!—*I. insignis* (in part.), *Wall. Cat.* 4766.

β . Pedunculis 2-4-floris.

Hab. Sylvis subtropicis temperatisque Himalayæ orientalis et centralis; Nepal! *Wallich*; Sikkim, 3000-6000 ped.! *J. D. H.*— β . Mont. Khasia, alt. 5000-6000 ped.! *J. H. & T. T.* (fl. June-Dec.). (v.v.)

Species variabilis, erecta, 1-3-pedalis; caule simplici v. parce ramoso. *Folia* basi non ciliata v. setigera. *Pedunculi* 1-3 pollicares, basi bracteati. *Flores* *I. flaccidæ*? subsimiles. *Calcar* gracile, $\frac{1}{2}$ ". *Capsula* glaberrima, pollicaris. *Semina* (immatura) parva?

In all *Wallich's* Nepal and our Sikkim specimens the peduncles are 1-flowered, in our Khasia ones 2-4-flowered.

c. Perennes. Epiphyticæ. *Caules* breves, crassi. *Folia* versus apices ramorum conferta. *Pedunculi* 2-3-flores. *Capsulæ* breves, rostratæ.

62. *I. JERDONIÆ* (*Wight in Madr. Journ. Sc.* v., *lc.* t. 1602). Epiphytica, glaberrima, caule brevi procumbente radicante, ramis floriferis ascendentibus, foliis gracile petiolatis ovatis acutis sinuato-sub serratis sinubus et apice setulosis, pedicellis gracilibus pedunculo longioribus, sepalis lanceolatis, labello longe saccato ventricosso, calcare brevi incurvo.—*Hook. Bot. Mag.* 79, t. 4739.

Hab. Ramis truncisque arborum Mont. Anamallay et Nilghiri ad Sispara Ghat! *Wight*.

Rami cicatricati. *Folia* $1\frac{1}{2}$ -2 $\frac{1}{2}$ " longa, petiolo $\frac{1}{2}$ - $\frac{3}{4}$ ", utrinque glaberrima. *Pedunculi* cum pedicellis folia æquilonga. *Flores* rubri, labellum magnum inflatum, fere pollicare, vexillum alæque parvæ. *Sepala* petalis æquilonga, alæ oblique bilobæ, lobis imbricatis rotundatis. *Vexillum* galeatum.

This, as *Wight* observes, is most nearly allied to *I. Walkeriæ*. The latter I have been obliged to put in the racemose group of the order, though, with the present and two following, it forms the most natural section of the genus.

63. *I. AURICULATA* (*Wight in Madr. Journ. Sc.* v. p. 8. t. iii.). Epiphytica, glaberrima, caule brevi crassissimo nodoso articulato, foliis petiolatis ovatis ellipticisve acutis subserratis, pedunculis brevibus 2-floris, pedicellis gracilibus, sepalis maximis dependentibus, vexillo brevi concavo profunde bifido, labello longe saccato apice breviter calcarato.

Hab. Peninsulæ montibus prope Courtallam ! *Wight*.

Species valde singularis, *I. Jerdoniæ* arcte affinis sed caulibus crassioribus sæpe nodosis, pedunculis brevioribus, sepalis labello æquilongis, et calcare brevior.

64. *I. VIRIDIFLORA* (*Wight in Madr. Journ. Sc.* v. p. 9). Glaberrima, caule brevi crassissimo ramisque nodulosis, foliis crasse petiolatis ovato-lanceolatis acutis serratis, pedunculis brevibus bifloris, pedicellis gracilibus, sepalis linearibus, vexillo alte bilobo dorso alte carinato, labello conice subsaccato in calcar incurvum angustato.

Hab. Malabar ad Mont. Shivagerry ! *Wight*.

I. auriculatæ et *I. Jerdoniæ* arcte affinis ; sed caule crassiore, foliis majoribus, 3" long, nervis validioribus, sepalis lanceolatis, labelloque vix saccato sed in conum incurvum apice uncinatim calcaratum sensim attenuatum.

F. UMBELLATÆ et CAPITATÆ (vide p. 113).

Vide *I. Goughii*, *trilobata*, *sulcata*, &c., in § C ; *I. longicornu*, *racemosa*, et *bicornuta* in § G.

65. *I. BRACTEATA* (*Coleb. MSS. in Roxb. Fl. Ind. Ed. Carey*, ii. 458 ; *Wall. Cat.* 4760 !). Glaberrima, caule erecto parce ramoso, foliis longe petiolatis ovato-lanceolatis utrinque acuminatis subserratis basi ciliatis, pedunculo terminali apice densifloro, bracteis magnis recurvis crinitis, floribus purpureis.

I. fimbriata, *Hook. Exot. Flor.* ii. t. 146.

Hab. Mont. Khasia paludibus subtropicis temperatisque, alt. 4000–6000 ped. ! *De Silva, Griffith, &c.* (fl. Jun.–Aug.). (v.v.)

Planta pulcherrima, pedalis et ultra ob. bracteas crinitas distinctissima. Flores purpurei. Exemplaria depauperata ludunt floribus fere ebracteatis v. bracteis subulatis.

66. *I. JANTHINA* (*Thwaites, En.* p. 68). Herbacea, pusilla, simplex, glaberrima, foliis 1–4 membranaceis ovatis late oblongisve acuminatis denticulatis, petiolo eglanduloso, sepalis oblongis subacutis, vexillo rotundato, labello, infundibuliforme in calcar incurvum sensim producto.

Hab. Ceylon ! *Walker*, regione tropica, *Thwaites*.

Species parvula, 3–5-pollicaris. Folia sæpissime 2 opposita 1–4" long. $\frac{1}{2}$ –2 lat. Pedunculus 2–3". Pedicelli breviter racemosi, bracteis ovalibus persistentibus. Flores pulchre violacei, $\frac{1}{2}$ – $\frac{3}{4}$ " lat. Capsula polysperma.

67. *I. LEUCANTHA* (*Thw. En.* p. 67). Herbacea, pusilla, simplex, foliis approximatis lanceolatis acuminatis denticulatis parce pilosis basin versus petioloque subalato glanduloso-setigeris, labello in calcar æquilongum rectum conicum apice (siccum) subabrupte attenuatum producto, alarum lobo posteriore parvo lanceolato, anteriore multo majore inæqualiter 3-partito apicibus rotundatis.—*Descr. Ex. Cl. Thwaites*.

Hab. Hinidoon and Kittoot Gala in Ceylon, *Thwaites*.

“Ab *I. appendiculata*, quæ valde similis affinisque calcaris petalorumque forma præcipue differt. Flores albi, sepalo anteriore rufo-galeato.”—*Thw.*

I have not seen *Thwaites*' specimens, but fear I may have confounded this species with *I. appendiculata*.

68. *I. LINEARIS* (*Arn. in Hook. Comp. Bot. Mag.* ii. 323). Humilis, glaberrima, caule simplici robusto, foliis approximatis anguste lineari-lanceolatis acuminatis serratis subcoriaceis, bracteis ovatis acuminatis, pedicellis filiformibus, sepalis breviusculis ovatis acuminatis, labello concavo brevissime calcarato, vexillo brevi dorso cornuto, alis magnis bipartitis segmento laterali minore terminali magno obovato unguiculato.

Var. β . Foliis petiolatis elliptico-lanceolatis.

Hab. Sylvis montosis subtropicis Ceyloniæ, alt. 4000–6000 ped. !
Walker, &c.

Caules subcæspitiosi, 4–6". Folia 2–3" in petiolum brevem angustata. Flores $\frac{2}{3}$ " longi. Capsulæ ellipticæ, glaberrimæ.

69. *I. APPENDICULATA* (*Arn. in Hook. Comp. Bot. Mag.* ii. 323.).

Herbacea, pusilla, glabra v. pilosula, foliis approximatis v. verticillatis petiolatis ovatis lanceolatisve utrinque acuminatis setuloso-serratis membranaceis, pedunculis elongatis, bracteis lanceolatis, pedicellis filiformibus, sepalis ovatis oblongisve, labello parvo saccato apice breviter calcarato, vexillo parvo gibbo, alis bipartitis.—*Thwaites, En.* 47.

α . Foliis oblongo-lanceolatis acuminatis, pedunculis folia superantibus.

β . Foliis ovatis, pedunculis foliis brevioribus.

γ . Foliis 3–5 ovatis verticillatis pubescentibus.

δ . Foliis verticillatis anguste elliptico-lanceolatis.

Hab. Sylvis montosis subtropicis Ceyloniæ ! *Walker, &c.*

Species parvula, variabilis, 4–8". Folia flaccida, 1–6". Flores valde membranacei, "albidi v. pallide rosei; vexillum transverse rubro-striatum, alis bilobis; lobo, antico parvo lanceolato longe caudato, posticis majore, semicordato acuminato."—*Thw.*

70. *I. UMBELLATA* (*Heyne in Roxb. Fl. Ind. Ed. Wall.* ii. 464; *Wall.*

Cat. 4759!). Humilis, caule simplici longe nudo, foliis breve petiolatis subverticillatis ovatis obtusis acutisve crenato-serratis, pedunculis erectis foliis subæquilongis, bracteis oblongis obtusis, floribus amplis, sepalis late ovatis acutis, labelli lamina parva cymbiformi, calcare elongato gracili incurvo, vexillo orbiculari emarginato, alis subhorizontaliter patentibus bilobis lobis obtusis.—*Wight & Arn. Prodr.* 137; *Wight, Cat. N.* 745; et in *Madr. Journ. Sc.* v. p. 9. t. iv.

Hab. Sylvis tropicis montosis Malabarici, prope Courtallum ! *Wight* (fl. Aug.–Sept.).

Herbacea, 4-12'', glabra. *Radix* tuberosa (ex *Wight*). *Folia* 1-4'', obtusa, crenata. *Flores* 5-6, sub $\frac{2}{3}$ lati. *Capsula* breviter elliptica, glabra. *Semina* echinata (*Wight*).

71. I. SUBCORDATA (*Arn. in Hook. Comp. Bot. Mag.* ii. 323). Caule simpliciter longe nudo v. basi repente ramoso, foliis longe petiolatis ovatis v. ovato-lanceolatis subacutis v. acuminatis basi cordatis rotundatisve grosse crenatis, pedunculis folio brevioribus, bracteis ovato-lanceolatis acuminatis, pedicellis gracilibus, sepalis oblongo-ovatis acuminatis majusculis, labelli lamina cymbiformi acuminata calcare elongato acuminato gracili incurvo, alis latis.—*Thw. En.* 67.

Hab. Sylvis montosis subtropicis Ceyloniæ, alt. 5000-6000 ped. ! *Walker, &c.* (fl. Sept., Oct.).

Species variabilis. *Caules* 4-10''. *Folia* 1-3'', obtusa v. acuta, petiolo elongato. *Flores* albidis, sepalis rufescentibus. *Capsula* parva, $\frac{1}{2}$ unc. longa.—*I. umbellata* valde affinis, differt bracteis acutioribus foliisque basi cordatis v. rotundatis.

72. I. UNCINATA (*Wight in Madr. Journ. Science*, v. p. 11. t. vi., *Icones*, t. 747). Caule erecto, foliis 2-3'' longe petiolatis ovatis ovato-cordatisve acuminatis serratis supra nervis pubescentibus subtus glaberrimis, petiolo apice glanduloso, pedunculis axillaribus elongatis erectis, bracteis parvis, floribus 4-8 mediocribus approximatis, pedicellis brevibus, sepalis amplis oblique ovatis acuminatis, labello subhemispherico calcare brevi ventricosso basi constricto apice uncinato, vexillo oblongo, alis bipartitis.

Hab. Sylvis tropicis Malabariæ, ad Courtallam ! *Wight* (fl. Aug., Sept.). *Caules* graciles. *Petioli* 1-2''. *Pedunculi* foliis breviores, 3-4''. *Pedicelli* $\frac{1}{2}$ '. *Flores* sub 1'' longi. *Alæ* lobo antico minore horizontaliter patente, postico semiovato obtuso. *Capsula* brevis, rostrata, oligosperma.

73. I. VISCIDA (*Wight in Madr. Journ. of Science*, v. p. 12, *Icones*, t. 746). Caule gracili erecto basi repente radicante angustato, foliis 2-3'' longe petiolatis ovatis acuminatis serratis nervis utrinque hispidulis, pedunculis axillaribus erectis filiformibus viscidis 2-4-floris, bracteis majusculis ovatis acuminatis, pedicellis breviusculis approximatis, floribus majusculis, sepalis amplis late ovatis longe acuminatis, labello brevi cymbiformi calcare longo gracili incurvo, vexillo oblongo acuminato, alis bipartitis lobis, semiovatis.

? An *I. cordata*, *Wight in Madr. Journ. Sc.* v. p. 10.

Hab. Montibus subtropicis Pulney Malabariæ, alt. 5500 ped. ! *Wight*.

Caulis ut videtur flexuosus. *Petioli* 1-3''. *Pedunculi* 4-5'', graciles. *Bracteæ* $\frac{1}{4}$ '' longæ. *Flores* rosei v. purpurascentes. *Capsula* elliptica, acuta, polysperma. *Semina* orbiculata, pilosa.

The *I. cordata*, *Wight*, from Dr. *Wight's* specimens, collected in the Shevagherry Hills, appears to differ from *I. viscida* only in the subcordate base of the leaves.

74. *I. ACUMINATA* (*Benth. in Wall. Cat.* 4754 !). Humilis, glaberrima, caule crasso simplici, foliis approximatis longe lanceolatis in petiolum angustatis acuminatis sinuato-crenatis subcoriaceis subtus glaucis nervis margine subparallelis, pedunculis axillaribus crassiusculis, bracteis magnis late ovatis obtusis, floribus magnis, sepalis majusculis oblique ovato-cordatis obtusis acuminatisve, labello limbo cymbiformi acuminato, calcare elongato sensim angustato incurvo, vexillo orbiculato, alis bipartitis.

Var. *a.* Foliis lanceolatis longius petiolatis apice elongatis.

Var. *β.* Foliis angustioribus interdum 6-pollicaribus.

Hab. Rupibus madidis Mont. Khasia regione subtropica, alt. 4000–5000 ped. ! *De Silva, &c.* (fl. Aug., Sept.). (v.v.)

Habitu *I. lineari* proxime affinis, sed major floribusque diversissimis. *Caules* cæspitosi, 5–14", stricti, erecti. *Folia* $\frac{1}{2}$ –1" lata, subtus pallida. *Flores* speciosi, pallide rubri, pollicares. *Capsula* breves, erectæ, $\frac{1}{3}$ ", oblongæ, subacutæ. *Semina* minima, lana fusca immersa !

75. *I. HOOKERIANA* (*Arn. in Hook. Comp. Bot. Mag.* ii. 324). Fruticosa, perennis, ramis crassis, foliis petiolatis carnosulis 3–6" ovalibus acutis acuminatisve crenato-serratis, petiolis apice biglandulosis, pedunculis robustis erectis elongatis, floribus maximis 4–6 longe pedicellatis umbellatis, sepalis majusculis oblongo-lanceolatis, labelli limbo parvo cymbiformi abrupte in calcar crassum elongatum attenuatum contracto, petalis amplis, vexillo orbiculari.—*Bot. Mag.* 79, t. 4704.

? *I. biglandulosa*, *Moon, Cat.* 18.

Hab. Montibus tropicis Ceyloniæ, alt. 3000–5000 ped., *Walker, &c.*

Species magnifica, elata, glaberrima. *Rami* crassitie digiti. *Petioli* 2–5", apicem versus glandulis 2-stipitatis. *Folia* multinervia. *Pedunculi* crassi, 4–6". *Bractea* decidua. *Pedicelli* 1–2". *Flores* speciosi, 2" lati, calcar interdum 2" curvo; petalis lateralibus et vexillo subæqualibus, margine crispatis, albis? rubro-striatis. *Capsula* pro-planta parva, $\frac{3}{4}$ " elliptico-lanceolata gibba, glabra.

76. *I. grandis* (*Heyne in Wall. Cat.* 4759 !).—*Arn. in Hook. Comp. Bot. Mag.* 324, *Madr. Journ. of Science*, v. t. iv.

Hab. Mont. tropicis Malabariæ ! *Heyne*, et ? Ceyloniæ, *Walker*.

Omnia *I. Hookeriana*, sed labello conico-infundibuliformi in calcar 2-pollicare sensim attenuatum, et petalo postico minore.

Thwaites suspects that this does not differ specifically from *I. Hookeriana*, and I have no doubt that he is right.

77. *I. CAMPANULATA* (*Wight in Madr. Journ. of Sc.* v. 11. t. vii., *Icones*, t. 744). Erecta, caule robusto, foliis 4–6" petiolatis late ovato- v. elliptico-lanceolatis acuminatis setuloso-serratis subtus glaucis, pedunculis axillaribus crassiusculis suberectis 3–4-floris foliis brevioribus, floribus umbellatis, bracteis magnis ovato-lanceolatis, floribus magnis, sepalis

amplis oblique ovatis rostrato-acuminatis, labello parvo cymbiformi calcare perbrevis incurvo, vexillo orbiculari mucronato, alis bipartitis.

Hab. Montibus subtropicis Pulney Malabariæ, alt. 5500 ped., *Wight*.

Caulis subramosus, herbaceus. *Folia* glandulosa. *Pedunculi* 3".

Bracteæ $\frac{1}{2}$ – $\frac{3}{4}$ ". *Flores* $1\frac{1}{2}$ " longi, subcampanulati, pallide purpureo-maculati. *Capsula* elliptica, utrinque attenuata, glaberrima. *Semina* plurima, creberrime echinata.

Very similar in many points to *I. lævigata*, but the common peduncles of the flowers are much longer, and the habit is very different.

78. *I. LÆVIGATA* (*Wall. Cat.* 4753 !). *Caule* elato robusto fruticoso, foliis 4–6" breve v. longe petiolatis oblongo- v. obovato-lanceolatis longe acuminatis late crenato-serratis basi petiolove glandulosis, pedunculis axillaribus terminalibusque brevibus 2–3-floris, floribus flavis, bracteis oppositis sepalisque amplis late ovatis rotundatisve acuminatis, labello conice saccato ventricoso calcare breviusculo uncinato terminato.

Hab. Sylvis umbrosis subtropicis tropicisve Himalayæ orientalis ad Sikkim, alt. 2000–4000 ped. ! Montibus Khasia, alt. 3000–5000 ped. !

De Silva, &c. (fl. Jul.–Oct.). (v.v.)

Caulis 4–6-pedalis, lignosus, ramosus; ramis nodosis, glabris puberulisve.

Folia basi sæpius obliqua, luride viridia. *Pedunculi* $\frac{1}{2}$ –1", robusti.

Flores subcampanulati, flavi v. sordide straminei, rubro-striati, 1– $1\frac{1}{4}$ " longi. *Capsula* ignota.

Species ob staturam, ramos lignosos, pedunculos breves 2–3-flores, bracteas magnas, flores flavidos, sepala ampla facile recognita.

A tall branched suffruticose species, with much of the habit of *I. Jurpia*, but readily distinguished by the large orbicular outer sepals.

79. *I. TAVOYANA* (*Benth. Wall. Cat.* 4773 !). *Humilis*, caule crassiusculo basi nudo, foliis 3–3" petiolatis ovatis acutis v. longe acuminatis integerrimis v. remotiuscule setoso-serrulatis basi longe setosis, pedunculis gracillimis foliis longioribus 8–14-floris, bracteis setaceis, pedicellis gracilibus; floribus parvis, sepalis subulatis, labello cymbiformi purpureo striato calcare recto subulato æquilongo, alis longe unguiculatis, capsula parva angusta lanceolata utrinque attenuato-acuminata oligosperma.

I. Tavagua, *Benth. sphalm. in Steud. Nomen*.

Hab. Peninsula Malayana ad Tavoy Gomez, Moulmein ! *Lobb*.

Species elegans, parviflora, *Circeæ* habitu, glaberrima. *Caules* simplices v. ramosi, 3–6". *Folia* pallide viridia, nitida, ut videtur flaccide membranacea; nervis paucis tenuibus. *Pedunculi* 3–4". *Pedicelli* capillares, pollicares. *Flores* pallide straminei vix $\frac{1}{2}$ " longi, vexillo ut videtur dorso breviter rostrato; alarum lobo terminali semiobovato, apice uncinato. *Capsula* sub $\frac{1}{2}$ " longa, torulosa, 2–3-sperma. *Semina* oblonga, compressa, opaca.

G. RACEMOSÆ (vide p. 113).

§ a. *Racemi* multiflores, pedicellis interrupte verticillatis, v. fasciculatis.

80. *I. RACEMOSA* (Wall. Cat. 4730! in part., non Don, Prodr.). Glaberrima, caule gracili simpliciusculo erecto, foliis 3-5" petiolatis lanceolatis v. elliptico-lanceolatis utrinque acuminatis apice caudatis grosse crenatis, pedunculis elongatis strictis gracilibus multifloris pedicellis verticillatis gracilibus bracteis parvis ovato-subulatis, sepalis minimis labello longe conice saccato in calcar curvum attenuato, vexillo orbiculato, alarum lobo terminali brevi v. elongato ligulato v. caudato; capsula lineari.—? Edgeworth in Linn. Trans. xx. 41.

I. micrantha, Don, Prodr. 205?

β?. Floribus majoribus, lobo terminali petalorum ligulato porrecto.

γ, *polyceras*. Bracteis majoribus sepalis apice labelli et dorso vexilli in cornu glanduloso-incrassatum productis.

Hab. Sylvis Himalayæ temperatæ, alt. 7000-10,000 ped., Nepal! Wallich; Sikkim! J. D. H.; β, Sikkim! alt. 7000-10,000 ped., et in Montibus Khasia, alt. 5000-7000 ped.! J. H. & T. T. (fl. Jul.-Sept.). (v.v.)

Herba 2-4-pedalis. *Folia* 4-6", grosse crenata, sinubus setigeris, petiolis basi sæpe glanduligeris. *Racemi* 3-6", stricti, pedicellis 1", verticillatis. *Bracteæ* basi ovatæ, apice sæpius elongato glanduloso-incrassato. *Flores* sub $\frac{1}{2}$ - $\frac{2}{3}$ " longi, pallide flavi v. pallide sordide lilacini. *Calcar* rectum v. paulo curvum, interdum apice bifidum. *Capsula* $\frac{3}{4}$ -1", apiculata, æqualis, teretiuscula. *Semina* opaca.—Variat ut videtur lobo inferiore alarum brevi v. elongato et porrecto.

Under *I. racemosa* in Wallich's Herbarium there are at least three plants, viz., the *I. leptoceras* and two others, which appear to differ chiefly in the racemes of one being interruptedly whorled, and of the other continuous: as Mr. Edgeworth has described the latter under the name of *I. tingens*, I have retained Wallich's name for the former.

The *I. tingens*, Edgeworth, appears to differ in no respect from this and from specimens marked *I. racemosa* in Wall. Herb., except in the flowers not being verticillate, and in the remarkable character of the posticous lobes of the lateral petals (alæ) being included in the spur, which I cannot but regard as an anomalous character. The whorled pedicels, numerous long erect racemes, small flowers and straight spur best distinguish *racemosa*. The var. γ approaches very closely *I. leptoceras*, var. θ; γ is distinguished only by the whorled inflorescence.

81. *I. BICORNUTA* (Wall. in Roxb. Flor. Ind. 11. 461, Cat. 4729 & 4765 in Herb. Henslow). Erecta, ramosa, foliis amplis approximatis ovato-acuminatis grosse crenato-serratis, racemis confertis erectis elongatis interruptis, pedicellis fasciculatis verticillatisque, floribus 1", lilacinis, sepalis late ovatis, labello inflato incurvo ascendente ore apicem versus in cornu producto, calcare brevi recurvo, capsula cylindrica.

I. longicornu, Str. & Wint. Herb. no. 4.

Hab. Himalaya centrali et occidentali Garwhal! *Strachey & Winterbottom*; Nepal! *Wallich* (fl. temp. pluv.).

A large-leaved, membranous, flaccid, very much branched species, but distinguished by the inflated saccate incurved labellum, rather suddenly terminating in a short recurved spur, as also by the long, erect, slender racemes, with whorled peduncles, slender capsules, and large pale lilac flowers. The petals terminate in long slender tails.

82. *I. LONGICORNU* (*Wall. Cat.* 4729, non *Flor. Ind.*). Erecta, ramosa, glabra, foliis alternis ovatis ovato-lanceolatisve glanduloso-stipulatis grosse crenato-serratis dentibus setigeris, pedunculis lateralibus et versus apices ramulorum fasciculatis erectis strictis elongatis multifloris, floribus versus apices pedunculi corymbosis racemosive 1" long. bracteis ovato-subulatis, sepalis parvulis oblique ovatis, labello longe saccato obtuso v. conico v. abrupte cornuto, capsula lineari-elongata recta stricta cum pedunculo directione continua.

a. Labello conice saccato, in calcar gracile incurvo attenuato.—*I. longicornu*, *Wall. Cat.* 4729, *Herb. Henslow et Lindley*.

β, *umbrosa*. Labello subcylindrice saccato in calcar breve tenue incurvum abrupte desinente.—*I. umbrosa* et *I. amphorata*, *Edgew. in Linn. Trans.* xx. 39; *I. picta*, *Floral Cabinet*, t. 128, fid. *Herb. Lindley*: ad *I. sulcatam* tendit.

γ, *cristigera*. Labello ut in *a*, floribus luteis aureisve rubro-venosis.—*I. cristigera*, *Edgew. MSS.* an sp. distincta?

δ, *bicolor*. Labello inter *a* et *β* media, petalisque aureis, petalo antico roseo.—*I. bicolor*, *Royle, Ill.* p. 151. t. 28.

ε, *pallens*. Floribus minoribus pallidis, labello ut in *a*.—*I. pallens*, *Edgew. in Linn. Trans.* xx. 39.

Hab. In Himalaya temperata media et occidentali, alt. 5000–10,000 ped., ad Nepal! *Wallich*, ad Marri! *Fleming*.—Var. *a*, Nepal! ad Marri! *β*, in Himalaya boreali occidentali tota; var. *γ*, in Kulu! *Edgeworth*, et Kashmir! *T. T.*; var. *δ*, Simla et Mussooree, *Royle*; var. *ε*, Garwhal, 4000–8000 ped.! *Edgeworth* (fl. temp. pluv.). (v.v.)

The *I. longicornu* of Wallich in Roxburgh's 'Flora Indica,' is not the plant of his Herbarium, no. 4729 in *Herb. Lindley et Henslow*, which latter differs from his description in the leaves being broader, not crowded towards the ends of the branches, nor linear-lanceolate; nor does it agree with Wallich's description in being a fleshy species with approximate ventricose joints, a leafy subfastigate panicle, and an exceedingly long filiform spur thrice the length of the pedicel, all which characters agree much better with *I. insignis*, Wall. The yellow fragrant flowers of the *I. longicornu*, described in 'Flora Indica,' are, however, unlike *I. insignis*, and suggest its being the *I. odorata*, Ham. (in *Don, Prodr.* 203), in the *I. leptoceras*, Wall., of which one Nepal specimen in *Herb. Henslow* (4760) well agrees with Wallich's character of *I. longicornu*. It is evident, I think, that three species have become mixed up

in Wallich's published description, 'Catalogue,' and original Nepalese MSS., and that these three include that to which we now confine the name of *longicornu* together with *I. leptoceras* and *I. insignis*.

The best characters for this species are the erect branching habit, alternate leaves, long erect peduncles, with subumbellate or shortly racemose large flowers, small lateral sepals, and the labellum well developed into a long sac, which is either conical or broadly cylindric and blunt, ending in a slender spur, and especially by the narrow capsule, which forms a straight line with the peduncle, and is neither inclined nor nodding. The flowers vary greatly in number, dimensions, and colour. Small states are difficult to distinguish from various congeners, according as their habit and the colour of the flowers inclines to one or another, as to *I. laxiflora*, *bicornuta*, *sulcata*, and *Roylei*. When the flowers are simply racemose, it is not easy to distinguish this from *I. laxiflora*.

b. *Racemi* continui (non interrupti v. verticillati) pedicellis plerumque alternis. *Calcar* elongatum.

* *Malabar et Ceylon*.

83. *I. MACULATA* (*Wight in Madr. Journ. Sc.* vii. 12). Caule ramoso sicco profunde sulcato piloso, foliis alternis longe petiolatis estipulatis ovato-lanceolatis serratis utrinque pilosis junioribus subtomentosis, pedunculis robustis rigidis elongatis multifloris, pedicellis horizontalibus, sepalis magnis late ovato-oblongis, vexillo parvo, labello conico in calcar gracile elongatum desinente, capsula brevi.

Hab. Malabar ad Mont. Shevagherry! *Wight* (fl. Aug.).

Species pulchra, *I. elongatæ* et *cornigeræ* affinis, caulibus foliisque longe albo-pilosis racemisque validis elongatis multifloris facile distinguenda. *Caules* 2-3-pedales? sicco rigiduli, flavi, profunde sulcati. *Folia* cum petiolo 1-2-pollicari, 4-6" long., $1\frac{1}{2}$ -2" lat., membranacea, subobtusè serrata, basi nuda v. secus petiolum glandulis magnis sessilibus stipitatisve ornatis. *Racemi* interdum spithamæi, pedunculo stricto simplici v. diviso, bracteis brevibus late ovatis, pedicellis gracilibus, $\frac{3}{4}$ -1". *Flores* cum calcare subpollicares. *Capsula* $\frac{1}{2}$ " long., medio turgida, acuminata, glabra. *Semina* pilis brevibus pustulata.

84. *I. WALKERI* (*Hook. Comp. Bot. Mag.* ii. 324. t. xviii.). Erecta, subramosa, foliis 2-3" ovato-lanceolatis utrinque acuminatis setoso-serrulatis, pedunculis folio sublongioribus 6-8-floris, bracteis late ovatis acutis, pedicellis gracilibus elongatis erectis, floribus pollicaribus coccineis, sepalis parvis ovato-cordatis, labello longe late ventricosoincurvo brevissime calcarato, alis parvis bipartitis.

Hab. Sylvis subtropicis montosis Ceyloniæ, alt. 5000-6000 ped. ! *Walker*, &c.

Species distinctissima ob sepalum posticum longe ventricosum saccatum incurvum petalæque parva coccinea. *I. Jerdoniæ* proxime affinis.—*Caules* 1-2-pedales.

85. *I. ELONGATA* (Arn. in Hook. Comp. Bot. Mag. ii. 324). Caule robusto, foliis 2–3" approximatis petiolatis lineari- v. ovato- v. obovato-lanceolatis ellipticisve acuminatis argute serratis coriaceis, pedunculo longissimo robusto, racemo elongato, bracteis ovatis oblongisve subacutis, sepalis ovato-oblongis acuminatis, labello cymbiformi calcare gracili elongato incurvo, vexillo parvo, alis bilobis, capsula brevi elliptica.—*Thwaites, En.* p. 67.

Hab. Sylvis montosis subtropicis Ceyloniæ! alt. 3000–4000 ped., *Walker, &c.*

Species distinctissima, pedalis et ultra. *Folia* subcarnosa, subtus pallida, minute punctulata, nervis validis. *Pedunculus* 6". *Racemus* 3". *Flores* 1", rubri. *Alarum* lobus anticus parvus, sepalis æquilongus, postico "multo majore oblique rotundato."—*Thw.*

86. *I. CORNIGERA* (Arn. in Comp. Bot. Mag. i. 323). Glaberrima, caule simpliciusculo longe nudo, foliis 3–6" ellipticis lanceolatisve obtusis longe acuminatisve in petiolum brevem angustatis crenatis sinibus setuligeris subtus pallidis, pedunculis elongatis multifloris, bracteis late ovatis acutis, pedicellis gracilibus, floribus flavis (cum calcare $\frac{3}{8}$ " long.), sepalis parvis ovato-cordatis acuminatis, labello infundibuliformi in calcar medioeri apice circinato attenuato, vexillo obovato acuto.—*Thw. En.* p. 67.

Hab. Sylvis montosis subtropicis Ceyloniæ; alt. 2000–4000 ped.! *Walker, Gardner, &c.*

Species primo intuitu calcare apice circinato, et capsula brevi oligosperma valde distincta, sed foliis variabilis. *Caulis* pedalis. *Folia* interdum late elliptica grosse crenata subtus subglabra, petiolo $\frac{1}{2}$ –1". *Pedunculi* foliis longiores. *Racemus* regularis, floribus nempe subæquidistantibus, bracteisque omnibus consimilibus. *Pedicelli* vix 1", patuli. *Flores* membranacei. *Capsula* brevis, $\frac{1}{3}$ " longa, compressa, elliptica, utrinque acuminata, oligosperma. *Semina* 2, orbicularia, compressa, nitida.

The habit of this is that of *I. uncinata*, *subcordata*, and others of the umbellate section, but the inflorescence is decidedly racemose.

**** *Mont. Himalaya et Khasia.*

87. *I. INSIGNIS* (DC. Prodr. 1688; Wall. Plant. As. Rar. ii. p. 83. t. 194, Cat. 4760! bis!). Caule simpliciusculo robusto erecto, foliis (6-poll.) subcoriaceis lineari v. oblongo-lanceolatis basi attenuatis apice acuminatis grosse serratis dentibus apice setigeris, pedunculis 6–8 terminalibus robustis erectis elongatis 10–15-floris, bracteis caducis, sepalis amplis oblique ovatis aristato-acuminatis, labello conice saccato in calcar elongatum gracile attenuato.

I. racemosa, Don! Prodr. 203—I. insignis! Wall. Cat. 4766 e Nepal. in *Hb. Linn. Soc.*

Hab. Montes Syllhet, Wall. in Herb. Linn. Soc.! Himalaya centrali Nepal, Wallich. fid. Plant. As. Rar.

Species robusta, 2-3-pedalis, insignis. *Folia* angusta. *Flores* rosei.
Cf. notulæ sub *I. longicornu*.

88. *I. TINGENS* (Edgw. in *Linn. Trans.* xx. 41!). Caule erecto gracili ramoso, foliis 2-4" membranaceis ovatis lanceolatisve utrinque acuminatis apice caudatis crenatis dentibus basi setigeris, pedunculis numerosis lateralibus et subterminalibus gracillimis erectis multifloris, bracteis subulatis, pedicellis capillaribus, floribus parvis ($\frac{1}{4}$ - $\frac{1}{3}$ ") flavis, sepalis parvis ovatis obtusis, labelli sacco conico in calcar medio cre rectum v. curvum sensim attenuato, vexillo orbiculari dorso mutico, alarum lobo terminali caudato.

I. micrantha, Don, *Prodr.* fid. Arn. in *Hb. Hook.*—*I. racemosa*, Wall. *Cat.* 4730 in part.

Hab. In Himalaya temperata tota, alt. 5000-12,000 ped. a Simla! *Comta. Dalhousie*; ad Sikkim! *J. D. H.*; Montibus Khasia, alt. 5000-7000 ped. ! *Lobb, &c.* (fl. temp. pluv.). (v.v.)

Species distinctissima, etsi characteribus a sequenti ægre distinguenda. *Caules* 2-4-pedales. *Folia* basi glandulis crassis sæpissime stipulata. *Pedunculi* 2-4", valde graciles (ut in *I. brachycentra*). *Pedicelli* $\frac{1}{2}$ ", gracillimi. *Flores* inter minimos. *Calcar* forma et longitudine varium. *Capsula* lineari-clavata, lævis, $\frac{3}{4}$ ", acuminata. *Semina* pauca, minuta, atra, pyriformia, rugosa.

In some of the specimens I find the posticous lobes of the lateral petals (which are extremely variable in form and shape) included in the spur, as described by Edgeworth; in others they are free, and I am disposed to regard the former arrangement as owing to an anomalous form of the petals, which are normally simply and shortly 2-lobed, as in *I. racemosa* and others.

89. *I. LONGIPES* (H. f. & T.). Glaberrima, caule gracili elato ramoso, foliis (3-4") alternis breve petiolatis ovato-lanceolatis longe acuminatis grosse crenatis sinubus setigeris, pedunculis subterminalibus axillaribusque longissimis gracillimis arcuato-patentibus apice racemosis 5-8-floris, bracteis lanceolatis caducis, pedicellis brevibus gracilibus, floribus flavis cum calcare pollicaribus, sepalis 2-4 parvis ovato-oblongis acutis, labello infundibuliformi in calcar subelongatum hamatum attenuato, alis in caudam tortam elongatis, capsula lineari.—An *I. urticifolia*, Wall. var.?

Hab. Sylvis temperatis Himalayæ, alt. 8000-10,000 ped.; Kumaon! *Str. & Wint.* (5); Sikkim! *J. D. H.* (fl. Jul.). (v.v.)

A tall branched delicate species, with alternate leaves and axillary, very long patent filiform arched peduncles, bearing at the very extremity three to six pale-yellow, narrow flowers, about $1\frac{1}{2}$ inch long, a good deal like some states of *I. leptoceras*. The labellum is of the form of a cornucopia, being a long slender cone or funnel, with an incurved slender spur. The lateral petals are linear, twisted, and as long as the spurred sepal. It differs from *I. urticifolia*, Wall. (of which I expect it is a variety), in the longer peduncles, smaller, more slender flowers, and form

of the spurred sepal and spur. Strachey and Winterbottom's specimen has much shorter peduncles than the Sikkim ones.

90. *I. URTICIFOLIA* (Wall. in Roxb. *Fl. Ind.* ii. 457, *Cat.* 4768). Glaberrima, caule elato gracili ramoso, ramis flexuosis, foliis sessilibus petiolatisque petiolo alato anguste ovato- v. oblongo-lanceolatis apice acuminatis vel caudatis crenato-serratis membranaceis, pedunculis lateralibus et terminalibus gracilibus patentibus folio brevioribus longioribusve 2-5-floris, pedicellis breviusculis bracteis, majusculis caducis, sepalis late ovatis acuminatis, labello saccato oblique conico ecalcarato vel calcare brevi incurvo subæquilongo terminato, alis caudatis, capsula lineari acuminata torulosa.

Var. *a*. Foliis ovatis, pedunculis lateralibus, floribus flavis, Wall. *Cat.* 4768 (*Herb. Henslow.*).

Var. *β*. Foliis ovato-lanceolatis longe caudato-acuminatis, pedunculis numerosis lateralibus terminalibusque 2-4-floris foliis brevioribus, floribus pallide cæruleis. (An una cum var. *γ* species distincta ?)

Var. *γ*. Foliis ovato-lanceolatis grossius crenatis, pedunculis validioribus, bracteis elongatis, floribus albis v. pallide rubro-purpureis.

Hab. Sylvis umbrosis temperatis Himalayæ; *a*, Nepal! Wallich; *β*, Sikkim, alt. 8000-10,000 ped.! *γ*, Sikkim, 10,000-12,000 ped.! J. D. H. (fl. Aug.). (v.v.)

Species pulchra, 3-4-pedalis, vage ramosa. *Folia* longe caudato-acuminata et basi longe angustata; ob pedunculos sæpe 1-floros vel laterales et terminales inter hanc sectionem et § E osculat. *Petioli* non glanduligeri, nec basi stipulati. *Pedunculi* gracillimi, 1-3", patentes. *Flores* mediocres, pallide cærulei. *Capsula* pollicaris, seminibus 1-seriatis. *Semina* magna, oblonga, fusca, testa lævi.

This is a very puzzling plant: Wallich's characters do not well agree with those of his no. 4768 in *Herb. Henslow* as to the leaves, which are shorter and broader than the description indicates. The flowers of the Nepal plant are yellow, but in the Sikkim varieties lilac, white, or purple. The leaves vary in size from 2-6 inches, and the peduncles, which are axillary and terminal, vary quite as much; generally they are very slender, patent, and filiform, but in var. *γ* often stout and erect, with large persistent subulate bracts. I find four lateral sepals in var. *γ*, of which the two accessory are often reduced to hairs. The spur is sometimes wholly absent in Sikkim specimens. The much greater size of the flowers, and their broad spurred labellum, sepal, and broad petals distinguish this from *I. longipes*, which is its nearest ally.

91. *I. LEPTOCERAS* (DC. *Prodr.* 1, 688, Wall. *Cat.* 4770). Glaberrima, caule erecto simplici v. ramoso folioso, foliis 2-5" ovatis lanceolatisve utrinque attenuatis breve petiolatis setuloso-serratis, pedunculis axillaribus subterminalibusque erectis gracilibus, bracteis ovato-lanceolatis acuminatis, floribus (cum calcare) $\frac{3}{4}$ -1" longis, sepalis mediocribus late ovatis subulato-acuminatis, labello infundibuliformi in calcar gracillimum incurvum v. rectum attenuato, capsula gracili lineari-clavata.

- I. longicornu*, Wall. MSS. non *Cat.*, et *Flor. Ind. Ed. Carey*, ii. 462.—
I. racemosa, Wall. *Cat.* in parte.
 Var. *a*. Caule crasso nodoso, foliis anguste lanceolatis 2-5", alarum lobo inferiore pendulo ter longiore quam lato latere gibbo.—*I. leptoceras*, Wall. *Cat.* 4770.—*I. longicornu*, Wall. in *Roxb. Flor. Ind.* ii. 462.—*I. odorata*, Don, *Prodr.* 213.
 Var. *β*. Foliis ovatis 1-2", alarum lobo inferiore lineari elongato obtuso.
 Var. *γ*. Floribus flavis purpureo-maculatis.
 Var. *δ*. Foliis lineari-lanceolatis floribus stramineis, alarum lobis rotundatis v. inferiore acuminato apices versus violaceis.
 Var. *ε*. Foliis amplis flaccidis, floribus albis v. purpureo notatis, alarum lobo postico obtuse bilobo breviusculo.
 Var. *ζ*. Foliis ovato-lanceolatis coriaceis, floribus aurantiacis, alis 3-lobis lobis brevibus.
 Var. *η*. Foliis amplis pedunculum excedentibus, bracteis caducis, floribus sordide luteis rubro maculatis, alis bilobis lobo laterali breviter ovato acuto, inferiore longe subulato, sepalis 4.
 Var. *θ*. Foliis amplis ovatis acuminatis, pedunculis numerosis folio longioribus, floribus pallide stramineis aurantiacisve, alis ut in *η*.
Hab. In Himalaya temperata tota a Sikkim, alt. 5000-10,000 ped. ! *J. D. H.* ; ad Simla ! *T. T.* et in Mont. Khasia ! alt. 5000-6000 ped., *Griffith*, &c.—Var. *a*, Nepal et Khasia ; var. *β*, paludibus Mont. Khasia ; var. *γ*, Sikkim ; var. *δ*, Khasia ; var. *ε*, Sikkim, Khasia, et Kumaon ; var. *ζ*, Khasia ; var. *η*, Sikkim ; var. *θ*, Sikkim et Khasia (fl. temp. pluv.). (v.v.)

A very variable and common plant, of whose varieties we have had great difficulty in disposing, being at first inclined to divide our extensive series of specimens into six very local species ; but when these became the subjects of comparative study along with our own and Cathcart's drawings, and with the suites of specimens from Wallich, Lobb, Strachey and Winterbottom, and especially of Edgeworth, it became at once apparent that to our six we must add as many other local species, not so much because they were distinct, as because they were intermediate in habit and characters (though not in geographical distribution) from our own. Under these circumstances we have thought it best to unite them all.

With regard to the name, we have adopted that applied by Wallich to good specimens in his own Herbarium, though under the same number we find also *I. racemosa*, *I. tingens*, and others. The *I. micranthemum*, Edgew., according to Edgeworth's specimens in Herb. Benth., is hardly different from *I. laxiflorum*, and differs from his description in *Linn. Trans.* in the flowers being fully $\frac{3}{4}$ inch long, including the spur, and not "minimi." Some of the varieties appear in the dry state to approach very closely some forms of *I. longicornu*, from which it is very difficult to distinguish them. The flowers greatly vary in size, from $\frac{1}{2}$ -1 inch long, including the spur, and in colour from a deep golden yellow to

white, or even pale purple, and they are often speckled with rose-colour or purple spots. Edgeworth describes a variety of his *I. micranthemum* as having the spur reduced to a small sac, from which, as well as from the size of the flowers of some of his specimens, I am inclined to suspect that his plant, or some of it, may be referable to *I. brachycentra*, K. & K. The *I. candida*, Lindl., doubtfully referred here by Edgeworth, is certainly a very different plant, having very large flowers, and being undoubtedly a variety of *I. Roylei*. Edgeworth's *I. elata* appears from his specimens to be a form of *I. leptoceras*, but the specimens are not sufficient for satisfactory determination.

This species is on the whole most nearly allied to *I. tingens*, but distinguished by its much larger flowers and longer spur; some specimens are, however, with difficulty distinguishable. There are sometimes pedicellate glands on the basal margins of the leaves.

92. *I. LAXIFLORA* (Edgew. in Linn. Trans. xx. 39). Caule elato erecto, foliis 3-6" longe petiolatis petiolo alato ovato-lanceolatis utrinque acuminate grosse crenatis sinibus setigeris, pedunculis numerosis gracilibus subterminalibus, racemis breviusculis, bracteis parvis ovato-subulatis, floribus aureis v. pallide purpureis cum calcare $\frac{3}{4}$ ", sepalis parvis ovato-subulatis, labello infundibuliformi in calcar rectum conicum flore longiore sensim attenuato, vexillo orbiculari concavo non cornuto, alis majusculis purpureis rotundatis v. inferiore longe caudato, capsula angusta lineari.

I. micranthemum? Edgew. in Linn. Trans. xx. 39.

Hab. Himalaya temperata, Sikkim, alt. 9000-11,000 ped. ! *J. D. H.*; Garwhal et Kumaon ! *St. & W., Madden*; Simla, 6000-8000 ped. ! *T. T.* (fl. temp. pluv.). (v.v.)

Herba 3-pedalis. Folia membranacea, alterna, basi interdum glanduloso-setigera, petiolo basi glandulis magnis non stipulata, sed interdum caulis infra petiolum linea glandularum nigrarum instructa est. Pedunculi 3-5", 6-14-flori. Pedicelli graciles, $\frac{1}{2}$ ". Flores pallide purpurei v. violacei, interdum sordidi? Capsula linearis, gracilis, $\frac{3}{4}$ ", oligosperma.

Very similar indeed to *I. leptoceras*, and probably only a form of that plant; but distinguished by its shorter spur and usually lilac lateral petals. Most of my specimens have rounded lobes to the petals, but in one of Strachey and Winterbottom's the lower lobe terminates in a long subulate tail.

93. *I. LEMANNI* (*H. f. & T.*). Erecta, glabra, caule ramoso, ramis suboppositis, foliis longe petiolatis late ovatis obtusis obtuse dentatis, pedunculis elongatis apice flores 3-5 gerentibus, bracteis parvis late ovatis, floribus majusculis, sepalis late ovato-cordatis, vexillo hemispherico, labello late infundibuliformi in calcar elongatum gracile incurvum abrupte attenuato, alis amplis.

Hab. Afghanistan solo arenoso prope Otipore ! *Griffith*, 1251, *It. Not.* p. 346 (Herb. Lemann, et Bentham).

Species valde distincta, ob folia longe petiolata late ovata obtusa et obtuse sinuato-dentata (ut in *I. noli-tangere*) facile distinguenda. Exemplar solitarium annuum, spithamæum, ramosum. *Petoli* $\frac{1}{2}$ –1", lamina 1". *Pedunculi* graciles, foliis æquilongi. *Flores* rosei, conferti v. racemosi, pedicellis $\frac{1}{2}$ ", cum calcare 1–1 $\frac{1}{2}$ " longi.—"Calcar fusco-rubrum, alis basin versus albis, limbo aurantiaco-maculatis."—*Griffith*.

This species belongs in habit and foliage to the group with *I. noli-tangere* and *fulva*, and has no very near ally in India.

94. *I. GLAUCA* (*H. f. & T.*). Elata, tota glauca, foliis longe petiolatis oblongo-cordatis grosse crenatis, pedunculis terminalibus lateralibusque fructiferis robustis elongatis 8–12-floris, pedicellis fructiferis robustis patulis, capsula lineari-clavata acuminata oligosperma.

Hab. Himalaya occidentali temperata; Kumaon ad Dwali, alt. 9500 ped. ! *Strachey et Winterbottom*.

Species singularis (sed exemplar mancum) ubique pallide pruinoso-glauca. *Caulis* 3-pedalis, ramosus, crassitie digiti minoris. *Folia* 1–4-pollicaria membranacea, supra pallide viridia. *Pedunculi* fructiferi 6–10". *Flores* ignoti. *Capsula* 1 $\frac{1}{2}$ ". *Semina* magna.

95. *I. TUBERCULATA* (*H. f. & T.*). Caule erecto ramoso, foliis 1–2" breviuscule petiolatis elliptico-ovatis lanceolatisve utrinque acuminatis in petiolum angustatis grosse crenatis dentibus basi glandulosis, pedunculis brevibus terminalibus lateralibusque 4–8-floris, pedicellis brevibus, floribus sordide purpureis, sepalis falcatis, labello conico gibbo non calcarato, capsula brevi clavata verruculosa.

Hab. Himalaya orientali temperata et subalpina, Sikkim, alt. 10,000–13,000 ped. ! *J. D. H.* (fl. Aug.–Sept.). (v.v.)

Herba robusta, 2–3-pedalis. *Folia* glandulis dentium versus apices interdum setigeris, nervis tenuibus valde divergentibus; glandulis nullis, v. interdum ad basin foliorum v. petiolo v. caule ad basin petiolo sessilibus v. stipitatis. *Flores* $\frac{1}{2}$ – $\frac{1}{2}$ " longi. *Capsula* papillis magnis subseriatis verruculosa, crassiuscula, $\frac{1}{2}$ " longa.

96. *I. BRACHYCENTRA* (*Kar. & Kir.*). Caule elato ramoso gracili, foliis 3–5" petiolatis membranaceis elliptico-lanceolatis utrinque acuminatis crenatis serratisve dentibus apice setuligeris, pedunculis numerosis terminalibus gracillimis multifloris, bracteis subulatis, pedicellis gracillimis, floribus pallidis minimis, sepalis parvis oblongo-lanceolatis, labelli sacco conico acuto, capsula lineari glaberrima acuminata oligosperma.

? *I. elata*, *Edgew. in Linn. Trans.* xx. 41.

Hab. Himalaya occidentali temperata, alt. 5000–9000 ped. a Kunawur !

Jacquemont T. T.; ad Marri ! *Fleming* (fl. Jun.). (v.v.).

Dist. Soongaria.

Herba 2-4-pedalis. *Folia* pallide viridia, nervis divergentibus tenuissimis, basi setoso-glandulosa v. nuda, petiolo interdum basi utrinque glandula cylindrica v. depressa instructa. *Pedunculi* 3-5", stricti. *Pedicelli* 1". *Flores* $\frac{1}{4}$ " longi. *Capsulae* $\frac{3}{4}$ ". *Semina* 3-6, oblonga, opaca, striata, sub lente lineis crebre rugulosis notata.

Very nearly allied to *I. parviflora*, DC., of Siberia, and perhaps only a short-spurred form of that plant. Edgeworth's specimens of *I. elata* in Herb. Benth. are imperfect, wanting the flower, but in habit, foliage, fruit, &c., they entirely accord with the *I. brachycentra*.

H. HYDROCERAS, *Blume*.

1. *Hydroceras triflora*, *W. & A. Prodr.* i. 140.

Impatiens angustifolia, *Blume*.—*I. triflora*. *L.*—*I. natans*, *Willd.*

Hab. Ubique in uliginosis, Bengalæ! utriusque Peninsulæ! Ceyloniæ! et Birmæ! (fl. temp. pluv.). (v.v.)

Dist. Java!

POSTSCRIPT.—Lieut. R. H. Beddome, in his paper alluded to in the foot-note at p. 112, has described twelve additional Peninsular species from the Anamallay Hills, and given a synoptical table of all the Peninsular species, in which two more species, *I. phænicea* and *I. Pulneyensis*, are briefly diagnosed. Lieut. Beddome's paper seems to be a very good one, and I have little difficulty in referring all his new species to the sections I have established; they are the following:—

§ A *I. verrucosa*. *Alæ* bilobæ, verrucosæ. *Calcar* elongatum.

Hab. Mont. Anamallay, alt. 5000-7000 ped.

I. crenata. *Alæ* bilobæ, cum fasciculo pilorum. *Vexillum* crenatum. *Calcar* breve.

Hab. Mont. Anamallay, alt. 5000 ped.

I. Akka. *Flores* magni. *Alæ* bilobæ, cum fasciculo pilorum. *Vexillum* integerrimum. *Calcar* breve.

Hab. Mont. Anamallay, alt. 7000-8000 ped.

I. tenuis. *Flores* parvi. *Alæ* bilobæ, pilosæ. *Vexillum* integerrimum. *Calcar* breve.

Hab. Mont. Anamallay, alt. 5000-7000 ped.

I. gracilis. *Alæ* integræ. *Calcar* elongatum.

§ B *I. ligulata*. *Alarum* lobus interior ligulatus. *Calcar* absconditum!

Hab. Sylvis, alt. 2000-3000 ped.

§ C *I. viscosa*. Erecta, ramosa. *Pedunculi* viscidii, 6-12-flores. *Calcar* curvum gibbum. *Semina* echinata.

Hab. Mont. Anamallay, alt. 3000-5000 ped.

I. Anamallayensis. *Folia* opposita, ramorum alterna. *Pedunculi* 6-8-flores. *Calcar* breve, rectum. *Semina* villosa.

Hab. Mont. Anamallay, alt. 5000-7000 ped.

- I. *Pulneyensis*. *Bractææ glandula terminatæ. Calcar non gibbosum.*
Hab. Mont. Pulney, alt. 8000 ped.
- § D I. *parvifolia*. *Folia minuta, cuneata. Pedunculi axillares, solitarii, elongati.*
Hab. Mont. Akka, alt. 8000 ped. (aff. *I. pendulæ*).
- § E I. *parasitica*. *Omnia ut videtur I. viridifloræ, sed alarum lobus superior sub vexillo reconditus.*
Hab. Mont. Anamallay, alt. 5000–6000 ped.
- I. *elegans*. *Erecta. Calcar 0. Semina pilosa.*
- § F I. *Tangachee*. *Pedunculi folia longe superantes, apice 4–8-flores. Flores minimi. Calcar gracile.*
- § G I. *Wightiana*. *Suffruticosa. Folia anguste lanceolata. Pedunculi solitarii, petiolum paullo excedentes, per totam longitudinem fliferi. Calcar breve, incurvum.*
Hab. Mont. Anamallay, alt. 4500 ped.
- I. *phœnicea*. *Calcar apice inflatum.*
Hab. Mont. Pulney, alt. 7000 ped.

Lieut. Beddome's paper supplies the following additional habitats and elevations to Peninsular species:—*I. scapiflora* attains 7000–8000 feet; *I. rivalis*, 3000 feet; *I. viscida* and *I. campanulata* ascend to 7000 feet; *I. maculata* grows on the Anamallays at 4500 feet.

I. filiformis is, according to Beddome, distinguished from *I. inconspicua* by the glabrous pedicels, and *I. cordata* from *I. viscida* by the peduncles not being viscid.

On the *Fumaria capreolata* of Britain.

By CHARLES C. BABINGTON, Esq., M.A., F.R.S., F.L.S.

[Read November 17, 1859.]

It is several years since there was considerable discussion amongst those botanists who take an especial interest in the accurate determination of British plants, concerning a *Fumaria* which grows plentifully in the Channel Islands, Western Cornwall, and near to the coast of Wales. It was then determined by Mr. Mitten (Lond. Journ. of Botany, vii. 556) to be the *F. agraria* (Lag.), and I, confidently believing that that identification was correct, gave a tolerably full description of it (Bot. Gaz. i. 62) under that name. At the same time I referred some Azorean specimens, received from Mr. H. C. Watson, severally to the *F. agraria* (Lag.), *F. muralis* (Sond.), and *F. capreolata* var. *media* of Webb. Concerning this, Mr. Watson remarked that, "to his eyes, after examining scores of the Azorean *Fumarias*, living and dried, they

seem all to belong to one species, and to be so little different, and so gradually dissimilar, as to be scarce worthy of separate names, even in the light of varieties only" (Phytol. iii. 805). As will shortly be seen, I now think that he was nearly, if not quite correct in those remarks. Opinions formed after the examination of only a few very imperfect specimens, and therefore little more than guesses, are never either conclusive or satisfactory. Mr. Watson's own view, which was founded upon scores of specimens examined when alive, is, of course, nearly conclusive against that formerly held by me. Of the three Azorean plants then noticed (Bot. Gaz. *l. c.* 63 & 64), two certainly do seem to belong to one species: the third (sent by Mr. T. C. Hunt from St. Michael's) looks far more like a form of the true *F. capreolata*; it is too incomplete for satisfactory determination. The two first-mentioned specimens I now refer to the *F. muralis* (Sond.) with some confidence; and if Mr. Hunt's broader-leaved plant is correctly joined to them, as was believed by Mr. Watson, we shall have arrived at the same result for the Azores that Mr. Lowe (Fl. Mad. 13) has done for Madeira, namely, that all the so-called *F. capreolata* of those islands is really the *F. muralis* of Sonder.

After reading Mr. Lowe's most valuable remarks (*l. c.*), I was led to re-examine my British specimens, in the hope of finding amongst them the *F. muralis*,—suspecting that my former *F. agraria*, which, in deference to the views of Dr. Walker-Arnott and Mr. Watson, I had ceased to regard as a species, might be rightly so named. Although the result is a little different from that expectation, all my supposed *F. agraria* proving to belong to the *F. confusa* (Jord.), nevertheless I find amongst plants received from Mr. Leighton examples of the *F. muralis*. This is the more interesting from Mr. Jordan's remark, made in the year 1848, concerning *F. muralis*. He said, "specimina hujus in Gallia lecta nondum vidi;" and as it is not noticed in the third edition of Boreau's valuable 'Flora of Central France,' nor in Lloyd's Flora of the West of that country, we may perhaps safely conclude that it has not even now been detected there. I possess an authentic specimen of *F. muralis* from Mr. Sonder himself, and another from the Island of Madeira, by which to determine the plant of Lowe. They accord very satisfactorily with each other and with the descriptions of the species as given by Sonder, Koch, A. Jordan, and Lowe.

These plants, together with *F. capreolata* (*F. speciosa*, Jord.), *F. pallidiflora* (Jord.), and *F. Boræi* (Jord.), combined with a few

others which inhabit the regions bordering on the Mediterranean Sea, constitute the Section *Capreolatae* of Hammar, in his 'Monographia Generis Fumariarum,' for a copy of which I am indebted to my celebrated friend Fries.

This group of *Fumarias* has long been the subject of discussion amongst botanists, and it still remains difficult to ascertain the characters considered as distinctive by the describers of the species; for the descriptions are scattered through various books, some of which are rarely to be met with, and being drawn up by writers holding different views concerning the value of characters, are often not of easy comparison. As early as the year 1839 Dr. Walker-Arnott (Edinb. Bot. Soc. Rep. iii. 106) described as varieties of *F. capreolata*, under the names of *α. australis*, *β. Reichenbachii*, and *γ. Anglica*, three plants (preferring to consider them "as well-marked varieties to separating them as ill-defined species"), which I believe to be the *F. speciosa*, *F. pallidiflora* (including *F. Boræi*), and *F. muralis* (perhaps including *F. confusa*) respectively. As Dr. Walker-Arnott had not noticed what I consider as the real distinctive characters of these plants, he exercised a sound judgment in calling them only varieties; but I rather wonder that in his editions of the 'British Flora' he does not mention them—even as such. The possession of authentic specimens, received from Mr. Leighton, enables me to identify Dr. Walker-Arnott's plants, and to award to him the credit of being apparently the first botanist to notice them. In 1841 Mr. Leighton (Fl. Shrop. 344) carefully described two forms of the supposed *F. capreolata*, and adds, that that which he distinguishes from the type of the species "merits attention and further remark," which, however, he does not seem ever to have given to it. His supposed type of *F. capreolata* I believe to be the *F. muralis*, Sond., and his second form is the *F. Boræi* (Jord.) and the *F. capreolata* *β. Leightonii* of my 'Manual.' Mr. Sonder (Koch, Syn. ed. 2. 1017) described his *F. muralis* in 1844; Mr. Jordan his *F. confusa* in 1848 (Cat. Dij. 18), his *F. Boræi* in 1849 (Cat. Gren. 15), his *F. speciosa* in the same year (Cat. Gren. 15), and his *F. pallidiflora* (Schultz, Arch. 305) in 1854.

Before proceeding to define the characters of these plants, care must be taken that the species allied to *F. agraria* (Lag.) are separated from the true *Capreolatae*. They all have very markedly tubercular-rugose fruit,—a rugosity very different from the slightly rough (dry) fruit of some of our plants. None of them have been found in Britain, the climate of which is too cold for them.

Those of the *Capreolatae* which it is necessary to consider on this occasion are the following: *F. pallidiflora*, *F. Boræi*, and *F. confusa* of Jordan, and *F. muralis* of Sonder. All of these appear to inhabit Britain, and they are also found in the neighbouring parts of Europe. Their fruit is nearly, although not always, entirely smooth. It is chiefly when the fruit is quite dry that a slight roughness may be occasionally detected; but, as was remarked above, in no case do they acquire the tubercular-rugose coat of the plants grouped as the *Agrariæ*.

Mr. A. Jordan appears to have been the first to point out a most valuable character which distinguishes one of these species, the *F. confusa*, in a remarkable manner, and which is applicable also to the others, although less conspicuously. The base of the fruit is furnished with a fleshy mass by which it is attached to the pedicel. The size and relative proportion of this mass (which may be called the *base*) to the fruit itself, and to the enlarged tip of the pedicel, can only be seen when the fruit is fresh (although it may be restored tolerably completely by softening the specimens in boiling water), and has therefore been overlooked by botanists. In *F. confusa* this *base* is so large as to be very nearly as broad as the broadest part of the fruit, and exceeds in width the slightly enlarged tip of the pedicel. In *F. Boræi* it is very narrow and nearly as long as broad, forming a kind of stalk to the fruit. It is much narrower than the rather remarkably enlarged tip of the pedicel. In *F. pallidiflora* the tip of the pedicel is not much enlarged, and very slightly exceeds in width the base of the fruit, which seems to be rather broader, but at the same time rather shorter and less conspicuous than that of *F. Boræi*. In *F. muralis* the tip of the pedicel is enlarged and is rather thicker than the base of the fruit, which is not nearly so broad nor so conspicuous as that of *F. confusa*. It widens gradually upwards, so as to give to the whole fruit a pyriform shape when fresh,—the line of separation between the true carpel and the “base” being only faintly marked. In *F. confusa* the limits of these parts are clearly defined.

There is a character furnished by the little pits at the top of the fruit (one pit being placed upon each side of the base of the style) which is probably of value. They are not very conspicuous on the fresh fruit, but show themselves obviously after its outer coat has shrunk in drying. In *F. pallidiflora* and *F. Boræi* these pits are small, deep, and nearly round; in *F. confusa* they are broad and shallow; in *F. muralis* they are usually so very shallow as often to be scarcely visible.

The size of the fruit separates *F. muralis* from its allies: it is much smaller and also much rounder. The other species now under consideration have fruits all very nearly equal in size, although differing in form.

There is a curious spur attached to, and apparently forming a continuation backwards of, the agglutinated filaments of the upper cluster of stamens. It is directed backwards into the spur of the upper petal, and may possibly furnish characters by which to assist in distinguishing species. I believe that the credit of first calling attention to it belongs to Parlatore, who describes and figures it in his 'Monografia.' My acquaintance with it is very slight, my attention having only recently been directed to it. If we may judge from books, few botanists appear to know of its existence.

I have failed in detecting any constant characters in the leaves, the forms and sizes of which are very variable. Neither does the erect or rampant or prostrate state of the stem seem to be of much consequence. When writing about *F. confusa* (my *F. agraria*) in the 'Botanical Gazette,' I remarked that the stem was erect in the earlier, and procumbent in the later part of the summer. Such I suspect to be also the case in the other plants now under consideration.

The differences which are found in the forms and proportions of the sepals and of the bracts will be noticed under the several species, as will be also the colour of the corolla and the direction of the fruit-bearing pedicels.

The only British plant which can be confounded with these *Capreolatæ* is the diffuse state of *F. officinalis*. It is perhaps often called *F. capreolata* by careless observers; and its being distributed by them with that name has tended to confuse the ideas of better botanists who have only had the dried specimens before them. Amongst nearly allied and similar-looking plants, it is often better to append no name to a specimen than to risk the application of a wrong one. This rampant form of *F. officinalis* agrees in nearly all respects with the erect and typical form of that species. Its spikes of fruit are very long and lax; its fruits are obovate-retuse, with a very faintly marked base and decidedly rugose surface; its lower petal is spathulate, being linear with the exception of a round dilatation at the end. As far as I am able to ascertain, the spikes of all these *Capreolatæ* are always much shorter; their fruits are never retuse, have always a marked base, and a surface which is not rugose, although sometimes slightly rough when dry; their

lower petal is not spatulate, but widens gradually throughout its upper half.

Dr. Walker-Arnott has shown (Edinb. Bot. Soc. Rep. iii. 99) that the typical *F. capreolata* (Linn.) is the plant found at Montpellier (the *F. speciosa* of Jordan). It is exceedingly beautiful, and has larger flowers than those of *F. pallidiflora*. Its corolla is white, but tinged reddish on the back and with a brownish-black tip. The pedicels are turned downwards, "parallel to the peduncle, almost from their point of insertion, and this before the flowers have fallen off, so that the spur of the flower is superior, the apex pointing downwards," to adopt his accurate words. The fruit is much smaller than that of *F. pallidiflora*, and closely resembles in size and form that of *F. muralis*, except that it is *not* "equally rounded at the top as elsewhere," but is slightly truncate; the apical pits also are small but deep. It seems to be quite a distinct species from either of those described in this paper, and is chiefly found in the South of Europe. Linnæus adopted it primarily from Bauhin, and DeCandolle ascertained that the plant found at Montpellier is that of Bauhin. I have a specimen of the *F. capreolata* (*F. speciosa*, Jord.) gathered at DeCandolle's station by Sonder. Linnæus also quotes Ray's 'Historia' (405) to his plant, and therefore gives England as a locality for it; but Ray's plant is certainly not that of DeCandolle, which is apparently as certainly that of Linnæus, who does not seem to have known it practically, but adopted it from his predecessors.

Some excellent botanists will doubtless say that these plants are all forms of one variable species, and I suppose that no person is in a position to contradict them; for who knows what really constitutes a species amongst plants? It seems to me to be just as impossible to prove that the "aggregate species," as Mr. Watson terms them, are quite distinct from each other, as it is to show that the "segregate species" are so. The difference between my views and those of my eminent friends referred to above amounts only to this, that they think that by a study of the aggregate species they best advance our knowledge of the vegetable creation, whilst I consider a discrimination of the segregate species to tend at least as greatly to that end. The search after truth is our common object, and, although we may be far from having yet attained to it, we all confidently hope that our accurate and honest endeavours will assist our successors in its discovery.

1. *F. PALLIDIFLORA* (Jord.): sepalis ovatis dentatis corollam dimidiam longitudine fere æquantibus ejusque tubum latitudine superan-

tibus, fructibus subgloboso-compressis obtusis longioribus quam latis lævibus, basi fructus brevi pedicelli apice angustiore, bracteis pedicellos floriferos excedentibus fructiferis reflexis paulo brevioribus, racemis evolutis laxis brevibus paucifloris.

F. pallidiflora, Jord. in *Schultz*, Arch. 305 ; *Bor. Fl. du Centre de la Fr.* ed. 3. ii. 34.

F. capreolata, Hamm. *Mon. Fum.* 24. t. 3 (excl. var. α et β).

Sepals soon falling, usually entire towards the point, as broad as or broader than the cor.-tube. Cor. large, cream-coloured, tipped with red or pink ; tube thick ; lower petal linear, green, boat-shaped, gradually dilated towards the end, its sides inflexed ; lateral petals linear, truncate-apiculate, with a narrow keel. Fruit with a short and rather narrow base which is very nearly as broad as the thickened tip of the pedicel ; edge not regularly rounded, but the whole vertical outline rather quadrangular ; apical pits small and deep. Fruit-stalks usually curved back, but sometimes only patent or divaricate.

The *F. capreolata* β . *Reichenbachii* of Arnott (*Rep. Edinb. Bot. Soc.* iii. 106) includes this plant and *F. Boræi*, as I learn from specimens named by Dr. Arnott for Mr. Leighton.

The fruit of my plant is always longer than broad, and its base has little of the stalk-like character of that of its nearest ally, *F. Boræi*, from which also its paler flowers and recurved fruit-stalks seem to distinguish it.

As the typical *F. capreolata* (Linn.) is the *F. speciosa* (Jord.), that name must disappear from our flora.

I have seen specimens of this plant from Salcombe and Ilfracombe, Devon ; Watchet, Somerset (Rev. W. W. Newbould) ; Oystermouth near Swansea, Glamorgan ; Caernarvon ; Oswestry, Shropshire.

2. *F. BORÆI* (Jord.) : sepalis late ovatis dentatis tubi corollæ latitudine latioribus eodemque $\frac{1}{2}$ brevioribus, fructibus subgloboso-compressis truncatis latioribus quam longis demum paulisper rugulosis, basi fructus angusta pedicellique apicem haud superante, bracteis sæpe pedicellos floriferos paulo excedentibus fructiferis patentibus brevioribus, racemis evolutis laxis brevibus paucifloris.

F. Boræi, Jord. ! " *Cat. Grenob.* 1849, 15 ; " *Pugil.* 4. *Lloyd*, *Fl. Ouest France*, 24. *Bor. Fl. Cent. France*, ed. 3. ii. 34. *Billot*, *Eexc.* No. 2209.

F. capreolata, *Curt. Fl. Lond.* ii. 145 (fasc. vi. 47) ; *Koch in Sturm*, *Deutschl. Fl.* 62. 13.

F. capreolata β . *Leightonii*, Bab. ! *Man.* ed. 4. 17.

F. capreolata (second form), *Leight.* ! *Fl. Shrop.* 345.

F. media a. *typica*, *Hamm.* 28. t. 3.

F. muralis, *Bor. Fl. Cent. Fr.* ed. 2, not *Sond.*

Sep. soon falling, attached above their base, deeply toothed at the base, often toothed throughout. Cor. rather large, pale, often purplish, with a dark purple tip; pet. gradually narrowed to an acute point at the tip; lower petal often free and either patent or declining. Fruit with a narrow base, which is usually, perhaps always, much narrower than the enlarged tip of the pedicel. The vertical outline is rather quadrangular with the sides rounded and top truncate; apical pits small and deep. Fruit-stalks patent, straight, or rarely slightly deflexed.

This is probably the *F. capreolata* of Smith, under which name Mr. A. Jordan received it from Sir W. J. Hooker (*Archiv*, 305). It is certainly the *F. capreolata* of Curtis's beautiful plate in the 'Flora Londinensis.' Sowerby's plate in 'English Botany' is probably taken from a specimen of *F. Boræi*, but may contain some traces of *F. muralis*. A minute examination shows that the drawing is not trustworthy.

The specimen from Winandermere, with long bracts, referred to *F. capreolata* in my paper published in the first volume of the Edinburgh Botanic Society's Transactions, is a state of *F. Boræi*.

Lloyd (*Fl. Ouest*) describes the fruit of his *F. Boræi* as "un peu plus long que large." It seems therefore probable that he may include the *F. pallidiflora* under that name. The fruit of my plant seems to be always rather broader than long, and is remarkable for the squareness of its vertical outline and the stalk-like appearance of its base: approaching in form to that of *F. officinalis*; but it is not so short relatively to its breadth, nor retuse. Its racemes are few-flowered and short, thus differing greatly from the long and many-flowered ones of *F. officinalis*.

F. Boræi is perhaps too nearly allied to *F. pallidiflora*; at least such seems to be the case when dried specimens are examined. Its leaflets appear to be narrower relatively to their breadth. The corolla is always much tinged with pink, which is rarely the case with those of its ally. Its sepals are usually more toothed, and are generally larger. Its fruit is different in shape; the base is broader, but still not so broad as the tip of the pedicel, although that part is less enlarged than in *F. pallidiflora*.

I have seen *F. Boræi* from Tenby, Pembrokeshire; Shrewsbury; Windermere, Lancashire; Glenmore near Lisburn, co. Antrim (Dr. J. H. Davies).

3. *F. CONFUSA* (Jord.): sepalis ovatis apiculatis dentatis tubi corollae latitudinem æquantibus eodemque $\frac{2}{3}$ brevioribus, fructibus subgloboso-compressis apice rotundatis demum paulisper rugulosis, *basi fructus latissima pedicelli apice conspicue latiore*, bracteis pedicellos floriferos æquantibus *fructiferis patentibus* duplo brevioribus, racemis evolutis laxis brevibus paucifloris.

F. confusa, Jord. *Cat. Dij.* 1848, 18; *Lloyd, Fl. Ouest Fr.* 24.

F. Bastardi, Bor. "in *Rev. Bot.* ii. 359"; *Fl. Cent. Fr.* ed. 3. ii. 34.

F. agraria, Mitt. ! in *Lond. Journ. Bot.* vii. 556; *Bab. ! in Bot. Gaz.* i. 62 (not *Lag.*).

F. capreolata, *Bab. ! Prim. Fl. Sarn.* 4.

F. capreolata γ . *media*, *Bab. ! Man.* ed. 4. 17.

F. media β . *confusa*, *Hamm.* 28. t. 3.

Sep. often persistent with the young fruit. Cor. rather large, but less than that of *F. pallidiflora*, dingy white or pinkish; tip and sometimes the back dark purple; tube rather thick; lower petal linear, flattened, blunt, keeled and brownish, and with inflexed sides towards the tip; lateral petals linear, truncate-apiculate, broadly but shortly boat-shaped, winged on the back. Young fruit rather obovate-acuminate. The fleshy base is nearly as broad as the fruit, and wider than the much-enlarged tip of the pedicel: it is scarcely narrower at its base than where it joins the fruit. The vertical edge of the fruit is regularly rounded, and the whole outline, above the enlarged base, is nearly round; apical pits broad but shallow.

If attention be paid to the shape of the fruit, and especially to its remarkable base, there cannot be any difficulty in distinguishing this plant from *F. pallidiflora* and *F. Boræi*; neither does it seem probable that any botanist who examines them when fresh will have doubts about the specific distinctness of this plant from its allies.

Had I possessed the acuteness of observation which belongs to Mr. Jordan, I should not have been misled into reducing this plant to a form of *F. capreolata*, after having recorded it as a species, although with an erroneous name. The effect of my so acting has been what is usual in such cases, viz. that the plant has suffered total neglect in this country. There seems to be no surer mode of diverting attention from a plant than that of placing it as a variety of some species supposed to be well known.

I have seen specimens of this plant from Jersey and Guernsey; Zennor and Trevena, Cornwall; Ilfracombe, Devon; Tenby, Pembrokeshire; Aberystwith, Cardiganshire; Bangor, Caernarvonshire; Hawkhead, Lancashire; and Dublin.

4. *F. muralis* (Sond.): sepalis ovatis acutis basi dentatis tubi corollæ latitudinem subæquantibus eodemque $\frac{2}{3}$ brevioribus, fructibus obovato-compressis apice rotundatis parvis sublævibus, *basi fructus lata obconica pedicelli apice paulo angustiore*, bracteis pedicellos floriferos æquantibus *fructiferis erecto-patentibus* brevioribus, racemis evolutis laxis brevibus paucifloris.

F. muralis, Sond.! in Koch, *Syn.* ed. 2. 1017; *Fl. Hamb.* 385. Jord. *Cat. Dij.* 1848, 19. Lowe! *Fl. Madeira*, 13. Fries, *Summa*, 146; *Fl. Dan.* t. 2473.

F. Petteri, Koch, *Syn.* ed. 2. 435 (not Reichenb.).

F. capreolata var. *media*, Fries, *Mant.* iii. 88.

F. capreolata (type), Leight.! *Fl. Shrop.* 344.

F. media γ . *muralis*, Hamm. 29. t. 4.

Plant usually more lax than its allies. Corolla smaller than that of *F. confusa*, tipped "dark atro-purpureous or black." Petals abruptly apiculate. The fleshy base is not nearly so broad as the fruit, and narrows very conspicuously from above downwards to the pedicel, the tip of which slightly exceeds it in width. The fruit, together with its base, has thus, when fresh, an obovate or nearly pyriform outline; it is equally rounded at the top as elsewhere, and neither pointed nor retuse, as is well remarked by Mr. Lowe; the apical pits are usually so very slightly impressed as almost to escape notice. The bracts are often not more than half as long as the fruit-stalks.

Fries seems to include under his *F. muralis* the plant of Sonder and also the *F. confusa* of Jordan; for he states (*Mant.* iii. 88) that it is the *F. capreolata* of Eng. Bot. (t. 943), and says of it, "*Galliæ occidentali, Britanniæ præcipue boreali et Norwegiæ extimis oris propria videtur.*" The plant of Western France is certainly the *F. confusa*. What the Norwegian plant may be is unknown to me, for I have not seen a specimen; but as it is found "*Norwegiæ maxime occidentalis,*" it may well be the true plant.

This is probably the type of the *F. capreolata* γ . *Anglica* (Arn.), which is considered as the true *F. capreolata* by Leighton. A considerable series of Leighton's specimens is before me, some of which were named (γ . *Anglica*) by Arnott. But, apparently, Arnott included the *F. confusa*, and perhaps *F. Boræi*, in that variety. Leighton seems to have inclined towards the opinion that his two forms of *F. capreolata* were distinct species, as is the fact. To him therefore is due the credit of first discriminating between *F. Boræi* and *F. muralis* in this country, although he refrained from naming the new species, and was unacquainted

with the most valuable characters by which they are distinguished from each other and from their allies.

I have seen *F. muralis* from Barnes, Surrey (Mr. Pamplin); Shrewsbury, Salop; Wrexham, Denbighshire (J. E. Bowman); Sheffield (Rev. W. W. Newbould).

Having now characterized all our species belonging to the group called *Capreolatae*, it may be well to add a similar notice of the true *F. capreolata* (Linn.), derived from specimens received from several parts of the South of Europe, and especially from some gathered by Mr. Sonder at Montpellier, in the place pointed out by DeCandolle.

F. CAPREOLATA (Linn.): sepalis ovatis basi dentatis tubi corollæ latitudine latoribus eodemque duplo brevioribus, *fructibus obovato-compressis obtusis parvis longioribus quam latis lævibus*, basi fructus lata obconica pedicelli apicem æquante, bracteis *pedicellis floriferis et fructiferis reflexis* brevioribus, racemis evolutis laxis brevibus paucifloris.

F. capreolata, Linn. *Sp. Pl.* 985. *DeCand. Syst.* ii. 133; *Fl. Fr.* iv. 639; *Prod.* i. 130.

F. speciosa, Jord. "Cat. Gren. 1849, 15;" in Schultz, *Arch.* 199; in Walp. *Ann. Bot.* ii. 28. Lloyd, *Fl. Ouest*, 24. Bor. *Fl. Cent.* ii. 34.

Sepals persistent, often even found with the fruit, usually entire in their upper half. Cor. very large, white, tipped with brown-black. Fruit half as large as that of *F. pallidiflora*. Base of the fruit not nearly so broad as the fruit and narrowing downwards to its point of attachment. The whole fresh fruit is rather pyriform, quite smooth; its apical pits conspicuous.

On *Combretum butyrosu*m, a new kind of Butter-tree from South-eastern Africa. By T. CARUEL of Florence. Communicated by J. D. HOOKER, M.D., F.R.S. & L.S.

[Read Nov. 17th, 1859.]

SEVERAL years ago Professor Joseph Bertoloni published an account of a kind of vegetable butter, which he had received from South-eastern Africa together with dried specimens of the tree that produced it. This tree Professor Bertoloni considered as belonging to a new genus, which he consequently described under the name of *Sheadendron*, and called the plant *S. butyrosu*m, from an idea that it was the same as the celebrated Shea-tree mentioned by Mungo Park. According to him, the *Sheadendron* could

not belong to any of the known orders of plants, but ought probably to constitute a new order of *Sheæ*, in the neighbourhood of *Myrtaceæ*.

Owing to the liberality of the learned Professor, who sent specimens of the plant, both in flower and fruit, to the Central Herbarium in Florence, I have been able to examine it more closely, and the result of my inspection has been to confirm a suspicion that had arisen in my mind, at first sight of the plant, that it was a *Combretaceæ*. In fact, I consider it as a true *Combretum*, from which it differs in no respect but in having an apterous fruit—a character by no means sufficient, I should think, to constitute it as a distinct genus, much more so as we see in the same order another genus (*Terminalia*) with winged or wingless fruits. The blossoms and the general habit are entirely those of a *Combretum*. The following description of the plant (which I shall call *Combretum butyrosium*) will, I hope, satisfy my readers as to the accuracy of the view I have taken of the subject.

COMBRETUM BUTYROSUM, Car. MSS. (*Sheadendron butyrosium*, Bert. !

Illustr. di Pianti Mozambicesi, dissert. 1^a, p. 12, f. 4, where the analyses of the flower are partly incorrect, the ovules of the inferior ovary being taken for a free ovary, &c. ; Walp. Ann. Bot. Syst. iii. 861).—

Arbor. Rami tenues, incurvi, teretes, juniores pube rufa adpressa villosi, dein glabrati cortice tenui griseo facile scindibili. Folia opposita, exstipulata, brevissime petiolata, petiolo villosa, elliptica, integerrima, margine tantulum recurvato, basi subcordata, apice cuspidata, breviter apiculata, reticulato-nervosa, nervis subtus prominentibus, $\frac{1}{2}$ –1 decim. longa, dura, supra lævia glabra, subtus pallidiora glandulisque exiguis crebre punctata. Spicæ (ut videtur indeterminatæ) multifloræ, densæ, breves, pedunculo brevi vel longiusculo stipitatæ, paucæ (ad summum 5) oppositæ vel alternæ in ramulis ex axilla foliorum ortis, quæcunque basi suffulta bractea lanceolata caduca. Flores erecto-patentes, sessiles, bracteola filiformi breviuscula comitati. Calyx obconicus, 8^{mm} longus, tubo brevissimo, cum ovario connato, villosa, limbo glabrescente, glanduloso, fauce parum ampliata, 4-dentata, dentibus brevibus, triangulis, barbatis, præfloratione valvatis. Petala 4, parva (1 $\frac{1}{2}$ ^{mm} longa), ad summam faucem inserta, cum dentibus calycinis alternantia, cuneata, truncata, apice eroso-dentata. Stamina 8, 4 cum petalis alternantia supra medium limbi calycini inserta, breviter exserta, 4 autem petalis opposita sub ore inserta, longe exserta. Filamenta filiformia, apice subulata, glabra, staminum omnium æquilonga, ante anthesin incurvata. Anthæræ parvæ, ovales, medio dorsi insertæ, utrinque emarginatæ, introrsæ, longitudinaliter dehiscentes, deciduæ, in sicco ochroleucæ. Pollen (in aqua) globosum, poris ut videtur tribus donatum. Ovarium inferum, uniloculare,

biovulatum, ovulis ex apice loculi pendulis, anatropis, raphe introrsa. Stylus simplex, filiformis, glaber, longe exsertus, in alabastro vario modo curvatus, stigmati simplici. Fructus fere magnitudinis nucis myristicæ, 1-2 in quoque pedunculo, ovales, acuti, tomentosuli, 4-sulcati, sulcis fundo rugosis, pericarpio ligneo, in valvis 4 partibili. Semen unicum, totum loculum fructus implens, substantia interna meandri-formi, in sicco inextricabili.—(v. s. sp.)

Hab. In Africa austro-orientali, et verisimiliter provincia Caffrorum.

According to the information gathered by Professor Bertoloni, the butter produced by this tree is called *Chiquito* by the Caffres, and commonly used to dress their victuals; it is also carried to the coast of Mozambique as an article of commerce. It is white, and rather hard, with a peculiar aromatic odour, which may be traced to the fruit and its kernel from which it is obtained. Its chemical composition is—Olein 25, Margarin 75=100.

I cannot agree with Professor Bertoloni in the opinion that our *Combretum butyrosu*m is the same as the Shea-tree of Mungo Park, as such an opinion is grounded on no other fact than that both are from Africa and produce a kind of vegetable butter. The figure given in the first Voyage of Mungo Park of the Shea-tree is of a plant far different from our *Combretum*, with its elliptical-oblong, slightly obovate, obtuse leaves, with rather long foot-stalks, alternate and clustered in close spirals at the top of the branches. The fruit also is different. Nor is there any reason to believe with Professor Bertoloni that the figure was drawn by mistake from some other plant. Mungo Park referred the Shea to the order *Sapotaceæ*, and it seems rightly, as it has been subsequently described by G. Don as a kind of *Bassia* (*B. Parkii*).

Descriptions of New Species of *Utricularia* from South America, with Notes upon the Genera *Polypompholyx* and *Akentra*.
By DANIEL OLIVER, jun., F.L.S. (With a Plate.)

[Read Nov. 17, 1859.]

I FURNISH, in the first place, a description, with an excellent figure by Mr. Fitch, of a new and remarkable epiphytcal *Utricularia* sent recently by Professor Jameson of Quito to Sir William J. Hooker.

UTRICULARIA, *L.* (Sect. *Orchidioides*, A. D.C.)

U. JAMESONIANA. Scapo gracili (2-3-pollicari) 1-2-floro, folio basi ejus lineari-lanceolato v. lanceolato-spathulato, corollæ labio

superiore amplo late ovato integro obtusissimo calycis lobum superiorem integrum ovatum obtusum superante, labio inferiore antice 3-lobato lobis obtusis integris v. centrali emarginato, calcar basali saccato-conico ultra porrecto cylindrico apice acutato calycis lobum inferiorem 2-3-plo excedente.

Ad fluvium Cosanga, Prov. Ecuador, legit Prof. Jameson.

U. rhizomate gracili ad truncos arborum repente, ad scapum et folium unicum etiam e nodis fibrillas tenues utriculiferas cum ceterisque paucis incrassatis tuberculatis emittente. Folia semper e basi scaporum ut videtur solitaria acuta v. obtusiuscula glabra in petiolum gracillimum attenuata. Scapus glaber interdum foliolis v. squamis 1-2 parvis lineari-lanceolatis basifixis instructus. Bractea lanceolata v. ovato-lanceolata bracteolis geminatis angustioribus æquilonga, omnes basifixæ et quam pedicellus breviores. Calyx lobis fere æqualibus glabris ovatis v. vix subcordatis, obtusissimis v. lobo inferiore leviter emarginato. Corolla purpurea (Jameson, in lit.) labio superiore pro planta magno verosimiliter nonnunquam apice abrupte obtuso, labio inferiore calcar brevior: calcar apicem versus pilis sparse obsitum. Ovarium tempore florifero in stylo crasso brevi sed fere æquilongo continuum. Capsulam maturam haud vidi.

Folia 6-10 lin. longa, 1-1½ lin. lata. Bractea 3-3½ lin. longa. A basi calycis ad extremum calcaris 6-8 lin. (Tab. I. fig. 1. Planta magnitudine naturali. *a*, *a*, flores integri; *b*, pistillum; *c*, folia; *d*, ampullæ sub lente auctæ, et *e*, eadem nascentes.)

Much smaller and more slender than *Utricularia unifolia*, Ruiz and Pavon, and *U. montana*, Jacq.*; differing also essentially in the spur, which exceeds the calyx, the three-lobed lip of the corolla, and other characters.

In enumerating the species of *Utricularia* collected by Richard Spruce, I desire to acknowledge the valuable aid afforded to me by the careful notes upon the plants in the fresh state, which, in accordance with the practice of that excellent botanist, accompany the specimens sent home by him. Comparatively few of them have been collected in sufficient quantity to supply the whole of his subscribers; and of some the specimens have been too much injured, or are otherwise insufficient, for accurate determination. Had the sections of the genus adopted by Benjamin, in his Monograph of the Brazilian species in the 'Flora' of Von Martius, recommended themselves to me as of practical use to botanists, I should probably have arranged these plants in accordance with them: some of these sections, based upon the presence or absence of ampullæ and of leaves at the time of flowering, are calculated to mislead.

* I am not aware that a specific difference exists between these plants.

No. 194. *Utricularia pallens*, St. Hilaire. Para coll.

No. 444. „ „ „ Santarem.

No. 1071. *U. Parkeriana*?, A. DC. Santarem. This plant is allied to the foregoing, but differs in its longer, cylindrico-subulate, adpressed, obtuse spur which exceeds the lower lip of the corolla. The specimens are scarcely in a condition to be determined without doubt.

No. 310. Santarem.

No. 963. South shore of Amazon. } *U. foliosa*, L.

No. 1611. Manaquiry.

Seeds about 20-24, flattened, peltate, girt with an obtusely polygonal, narrow, submembranaceous wing. I take *U. oligosperma*, St. Hil., to be the same species, as also the *U. vulgaris* figured in Flor. Flum. (tab. 44), and quoted by St. Hilaire and Girard (Monog. Prim. et Lent. p. 21) as representing their plant. Are not these forms of our *U. vulgaris*, L.?

No. 1053. *U. quinquerradiata* (Spruce's MSS.). Santarem.—I regard this as a small form of the *U. inflata*, Walt., of the North American continent. Specimens from Florida (Rugel, coll.), labelled *U. inflata*, var. *minor*, do not seem different.

No. 1041². An *U. purpureæ*, Walt., varietas? *U. myriocista*?, St. Hil. Santarem.—Corollæ albæ (marginē purpurascēte) labium superius rotundatum integrum, l. inferius amplum trilobatum lobis obtusissimis, calcar conico-cylindricum obtusum quam labium parum brevius. *U. palatina*, Web. MSS. (in Hb. Hook. vidi) ad eandem accedit.

No. 1044. Santarem, and

No. 2986. San Carlos. *U. longeciliata*, A. DC. (Prodr. viii. p. 23). *Polypompholyx laciniata*, Benjamin (in Linnæa, xx. pp. 316, 496, and Flor. Bras. *Utriculariæ*, p. 251).

Collected also by Gardner, Hostmann, and others in Brazil and Guiana. Benjamin errs in referring this plant to the Australian genus *Polypompholyx*, established by Lehmann (Nov. stirp. Pugill. viii. p. 48), the *Tetralobus* of A. DeCandolle (Prodr. viii. p. 667). The calyx of *Utricularia* is constantly diphyllous. In the true *Polypompholyx*, in addition to the anterior and posterior calycine segments, common also to *Utricularia*, we find a pair of opposite, lateral, and somewhat smaller lobes within the former. Minute lateral bracteoles with the usual subtending bract, as in numerous species of the allied genus, are also found at the base of the pedicel. It is upon the quadripartite calyx alone that the genus depends; in other respects it is, I believe, quite a *Utricularia*.

In *U. longeciliata* the lateral bracteoles, which are rather largely

developed, are not, as is usual, attached immediately by the bract, but spring from the very short pedicel at a small yet clearly marked interval beneath the true calyx-segments, towards which they are, of course, laterally disposed. Benjamin has erroneously regarded these bracteoles as forming part of the calyx, and indeed figures them as such in the 'Flora Brasiliensis.' It is undoubtedly a true *Utricularia*. A. DeCandolle, in describing the plant (Prodr. viii. 23), expressly states, "... bracteolis 2 majoribus flori adpressis;" and in the description of *U. fimbriata*, H. B. K. (Nov. Gen. et Sp. ii. 225), which I think the same species, we also find a correct view has been taken of these appendages:—"Pedunculi basi instructi bracteola ovata dentato-ciliata adpressa. Bracteæ duæ sub quoque flore, oppositæ, ovatæ, dentato-ciliatæ," &c. If an examination of the specimens of Humboldt and Bonpland confirm this presumed identity, their name must necessarily take precedence.

No. 1042. *Utricularia viscosa* (Spruce). Scapo (2-4-unciali) 2-6-floro viscoso, squamis parvis basi-solutis, calycis lobis subæqualibus rotundatis, corollæ albæ labio superiore rotundato integro lobo calycis fere duplo majore, calcar conico-cylindrico obtusissimo deinde curvato-porrecto corollæ labium inferius galeatum indivisum parum excedente, pedicellis fructiferis erectis, capsula globosa calycem superante. Santarem, floret mens. viii.

Folia non vidi. *Scapus* (fide Sched. Spr.) valde glutinosus, squamis ovato- v. lanceolato-rhomboideis utrinque plus minus acutis v. obtusiusculis. *Pedicellus* infimus adscendens 4-6 lineas longus. *Corolla* alba, labio superiore lineis purpureis notato, palato flavescente. *Semina* minuta, numerosa, rotundata v. elliptica, areolato-reticulata. Ab filamentorum insertionem ad apicem calcaris circiter 2 lineas.

No. 2569. *U. peltata* (Spr.). Foliis orbiculatis peltatis, scapo hirtiusculo (2-4 unciali) 2-4-5 floro, squamis minutissimis basifixis, pedicellis calycem æquantibus, calycis lobis æqualibus ovatis, corollæ labio superiore obovato-oblongo integro calycem superante, calcar porrecto conico-cylindrico obtusiusculo corollæ labio inferiore integro rotundato fere duplo longiore. Prope Panurè. Floret mense ix. (Tab. I. fig. 2. Planta mag. nat. a, a. Flores a facie latereque visi; b, b. folia peltata; c, radicis fibrilla utriculifera; d, ampulla magnitudine aucta.)

Folia per florescentiam persistentia numerosa, margine integra v. leviter crenulata, diametro 1-3 lin., petiolis gracilibus cum fibrillis paucis utriculiferis interdum instructis. *Bracteæ* basifixæ ovatæ v. lanceolatæ bracteolis lanceolatis æquilongæ. *Calyx* hirtiusculus, lobo superiore acuto, inferiore minute emarginato. *Corolla* purpureo-cærulescens palatum versus albescit, labio superiore infra angustato, inferiore basin calcaris amplectente. *Stylus* brevis sed primum ova-

rium fere æquans. A basi calycis ad extremum corollæ calcaris circa 3 lineas.

A remarkable little plant, forming patches one to two feet in diameter in a sandy islet in the Falls of Panurè. Sufficiently distinct in its peltate orbicular leaves from all the smaller species with which I am acquainted.

No. 1050. *U. Spruceana* (Benth.). Scapo $1\frac{1}{2}$ –3 unciali unifloro, pedicello e bractea marginibus ejus in vaginam parvulam infundibuliformem connatis, calycis lobis rotundatis integris, corollæ labio superiore oblongo emarginato v. retuso calycem fere duplo superante, labio inferiore antice leviter retuso v. subintegro, calcari crasso obtuso dependente v. paululo curvato labium corollæ inferius æquante v. parum excedente. Santarem.

Scapus gracilis esquamatus basi fibrillis radiceformibus utriculiferis, foliis in spec. nostris ut videtur tempore florifero desunt, bractea involucrifor-
mi basi in scapo continua margine supra leviter bilobata. *Calyx* lobis fere æqualibus obtusissimis, inferiore quam calcar 2–3-plo brevior. *Corolla* alba, fauce macula flava notata. *Stylus* primum ovarium fere æquans. A basi calycis ad extremum calcaris corollæ $1\frac{1}{2}$ –2 lin.

The singular, minute, sheath-like involucre may perhaps result from confluent bract and bracteolæ. Spruce sent it over under the MS. name of *U. uniflora*; this, however, was preoccupied by a plant of Robert Brown's.

No. 2858. *U. trichophylla* (Spr.). Scapo (5–12 unc.) pauci-multifloro, foliis capillaceo-gracillimis inter scapos erectis sursum pinnatifidis segmentis utrinque paucis angustissime linearibus simplicibus v. dichotomis, bracteis mediofixis, pedicellis remotis brevibus erectis, corollæ labio superiore integro elliptico v. ovato obtusissimo, calcari porrecto conico-cylindrico apicem versus oblique acutato labium corollæ inferius integrum subæquante v. vix excedente. Ad flumen Uaupès.

Radix fibrillis utriculiferis instructa. *Folia* 4–5 uncialia. *Bracteæ* basi obtusæ apice acutæ v. obtusiusculæ. *Pedicelli* breves calycem æquant v. vix duplo excedentes. *Calyx* lobis subæquantibus obtusissimis altero emarginato. *Corolla* flava, calcari circiter 3 lin. longo.

Spruce describes the remarkable and extremely slender leaves of this plant as growing erect amongst the scapes.

No. 3011. *U. neottioides* (A. St. Hilaire), β . *pedicellata*. Scapo 1– $1\frac{1}{2}$ unciali 2–4-floro interdum bifido, pedicellis capsulam 2–4-plo excedentibus.

In rupibus humectatis Monte Cocui, San Carlos. Flor. mens. vii.

Although differing much from *U. neottioides* in habit, I do not discover technical characters sufficiently marked to warrant its

publication as a new species. In *U. neottiioides* we find often many-flowered racemes, pedicels short, almost adpressed to the scape, "flowers subsecund, subnutant,"—altogether very suggestive of its specific name. In Spruce's plant the few flowers are not racemose, but with ascending or divergent pedicels 2–3 lines in length. Benjamin, in his Monograph of the Brazilian Utriculariæ, places this species under his section '*Ampullæ destitutæ. Folia divisa.*' Although I have not myself actually seen in the typical plant either leaves or bladders, yet I think he is here in error. In the present variety both occur, the leaves being entire. St. Hilaire and Girard, in a paper, previously quoted, on South Brazilian Lentibulariæ, &c. (p. 31), state, in describing their species—"Folia basi capillacea superius parum dilatata et divisa," &c., but follow with—"an potius primum integra, sed, parenchymate aquis mox destructo, nervi superstites?" I append a further description of the pedicellate form, which may be compared with the plant of St. Hilaire by those botanists who possess good specimens of it. It is not improbable but they may be correctly considered as distinct species.

Radix fibrillis utriculiferis instructa, utriculis gibboso-urceolatis prope basin lateraliter brevi-pedicellatis. *Scapus* erectus. *Folia* parva lineari-lanceolata integra obtusa, in petiolum gracillimum angustata. *Squamæ* scapi 2–3 ovatæ basi-solutæ utrinque obtusæ. *Calyx* lobis fere æquilongis, inferiore autem valde angustiore ovato obtuso, majore abrupte v. late rotundato-cuneato. *Corolla* albo-virescens, labio superiore concavo ovato-rotundato integro calycem plus quam duplo superante, labio inferiore profunde trilobo, lobis lineari-oblongis obtusis æqualibus, calcari saccato scrotiformi brevissimo obtuso.—Pedicelli fructiferi erecti. Capsula late elliptica v. obovata obtusissima, stylo subnullo.

No. 3238. *U. angustifolia*, Bj. (Linnæa, xx. pp. 311, 320). Flores flavo-virides. Esmeralda. Flor. m. xii.

No. 3735? Ad eandem valde proxima, differt corollæ colore purpurascente. Secus flum. Atabapo.

The specimens of this plant are imperfect.

No. 3241. Esmeralda, in campis humidis, xii. 1853.

Scapus 6 uncialis, foliis $\frac{1}{8}$ – $\frac{1}{2}$ unc. longis obovato-spathulatis. Flores cærulei, fauce lutea.

A single specimen with but one flower remaining. It corresponds very well with the description of *U. bicolor*, St. Hil.; the form of the leaves, however, of that species is undescribed.

No. 2967. "*Locis arenosis fl. Negro inundatis.*" San Carlos.

I refer this plant, though with some hesitation, to *U. cornuta*, Mx., of which I take it to be a small variety. In the same species may probably be merged *U. colorata*, Bj., and *U. appressa*, St. Hil. Style, at flowering, about equalling the ovary. Pedicels slender, erecto-patent, not shorter than the calyx. Spruce describes the leaves as ligulate, retuse, 1-nerved, with a few sacs underneath. Flowers yellow, with a red arc on the palate.

No. 1256. Barra?

No. 2257. San Gabriel.

No. 3644. Flum. Maypures.

These approach *U. subulata*, L., very closely. I cannot distinguish them from that species. *U. nervosa*, G. Web. MS. in Hb. Berol. (Benj. Monog. Utric. Bras. p. 247), seems to me doubtfully distinct from the same, and to this form probably Spruce's plants may be referred.

No. 3037. San Carlos. In bad condition; perhaps the same with the foregoing.

No. 924. Santarem. Likewise imperfect: apparently of the same difficult group with the last four numbers.

In the 'Linnæa,' vol. xx. p. 319, Benjamin describes, under the name of *Akentra*, a supposed new genus of *Lentibulariæ*, founded upon a plant of Hostmann's (Surinam Coll. No. 85), to but insufficient examples of which he had access. He appends to his description the following honest observation, which, however, can scarcely be said to establish the propriety of publishing the genus under such circumstances:—"Der Mangel des Sporns (weshalb ich den Namen *Akentra* (κέντρον, calcar) wählte) schien mir an mehreren Exemplaren, die ich sah, deutlich zu sein, doch waren die Blüthen durch das Trocknen so unkenntlich geworden, dass ich nicht ganz sicher bin, ob nicht vielleicht, was ich als Unterlippe beschrieb, der Sporn sei; künftige bessere Exemplare werden das entscheiden und vielleicht eine Aenderung des Namens nöthig machen." An examination of the specimens in the Kew Herbarium, collected by Hostmann, confirms the supposition here expressed, that the remarkably large, saccate, oblongo-cylindrical, and abruptly obtuse spur has been mistaken for the lower lip of the corolla, and that the plant is a true *Utricularia*. From the extreme delicacy of the corolla, I have not

completed its examination, especially that of its upper lip; but as ample characters are elsewhere furnished for its specific identification, at least in relation to those already described, we may refer it to the proper genus under the name of *U. Benjaminiana*. It resembles *U. inflata* in size and the presence of a floating verticil of abortive foliaceous axes on the lower part of the scape.

U. Benjaminiana. Axis demersus; foliis capillari-divisis sparse utriculiferis. Scapus infra verticillum natantem pilosus supra glaber esquamatus 4-7 pollicaris, vesicis 6-10 lin. longis lineari-lanceolatis utrinque angustatis apicem versus segmentis capillaceis instructis, 6-multiflorus. Bractee basifixae. Pedicelli calycem parvum æquantes v. duplo excedentes. Calcar denique 4-5 lin. longum, labio inferiore corollæ duplo longius, apice abrupte obtusum emarginatum. Capsula minute apiculata, seminibus circiter 5 complanatis ala membranacea anguste circumcinctis. *Akentra inflata*, Bj. Linnæa, xx. 319.

Note.—I may add to the above the correction of some misprints, &c., affecting the sense, which I observe in my paper on Indian *Utriculariæ*, published in the 'Linnean Journal' (Bot. Proc. vol. iii. p. 170). For "*aciculiferis*" and "*aciculifera*" (pp. 174, 175), read "*utriculiferis*," &c.; "Bracteis basi-volutis," read in all cases "*solutis*;" "*volute*" also, in foot-note, p. 174, should be "*solute*." In the description of *U. Wallichiana*, p. 182, line 7 from bottom, for "2-3-plo *longiore*" read "*breviore*."

Notes of a Visit to the Cinchona Forests on the western slope of the Quitenian Andes. By RICHARD SPRUCE, Esq. Communicated by Sir W. J. HOOKER, F.R.S., F.L.S.

[Read Dec. 15, 1859.]

MY last letter informed you that I was contemplating an expedition to the forests producing the Cinchona Tree on the western slopes of the Quitenian Andes. I was for some time doubtful as to what part I should visit—it was but two or three days' journey to the forests of Jilimbi and Guanujo at the western foot of Chimborazo, but to reach them the Paramo de Puenevata (the northern shoulder of Chimborazo) has to be passed near the snow-limit, and in the months of July and August it snows there almost incessantly, while the winds blow with a violence unparalleled even in this windy region, frequently hurling away both horse and rider, who are either seen no more, or their mangled remains are found

at the foot of some precipice. Besides, only one sort of *Cinchona* was known to exist in those forests, whereas by going a few days' journey farther to the southward, to the forests below Alausi, in the valley of the river Chanchán, I might expect to find three sorts, and the road thither nowhere ascends above 12,000 feet. So the latter plan was finally adopted, and on the 22nd of July I sallied forth from the pleasant town of Ambato (8500 feet) along the narrow "callejon" (lane) which separates the eastern from the western branch of the Cordillera. My company comprised five horses and mules, one mounted by myself, another by my servant, and the remaining three laden with my baggage, consisting of drying-paper, clothing and bedding, and a copious supply of tea, coffee, and sugar—articles rarely to be met with in a country where there are no inns, and where the inhabitants with few exceptions use no other beverage than aquardiente and sour chicha. An arriero took charge of the beasts of burden.

Our first day's stage to Riobamba was a long one, $12\frac{1}{2}$ Columbian leagues (about 40 English miles). The first five leagues, reaching to the village of Mocha, are along a very gradual ascent, varied by a few shallow quebradas. The soil is what in Yorkshire we used to call "a leight blow-away sand," which, when the sun and wind are up, scorches and blinds the traveller, though it produces scanty crops of maize, barley, peas and lupines (eaten here under the name of "chocchos"). The indigenous vegetation is limited to a few insignificant weeds, chiefly Composites, nestling under the hedges of *Yucca* and *Agave*. The flowers of the two latter plants—so great a rarity in England—are here to be seen all the year round, and their tall tree-like peduncles are the poles used throughout the Cordillera for all common purposes, such as fences, rafters, and even walls of houses, &c. Long files of asses laden with them enter the towns of Ambato and Riobamba every market-day.

Beyond Mocha we leave the sandy country, and after passing two streams which descend from Mount Carguairazo, on our right, we begin to ascend to the Paramo de Sanancajas, the grassy meseta which extends along the eastern base of Chimborazo, at a height of from 11,000 to 12,000 feet. Near its commencement the road leading from Quito to Guayaquil branches off to the right, while that to Riobamba and Cuenca continues straight on. The weather had been rainy for many previous days, and we had had drizzling rain all the way to Mocha, so that we were not without apprehension of suffering from the cold on the paramo. Fortunately, just

as we reached it, the sun shone forth, the clouds cleared away, and the glaciers of Chimborazo stood out against the blue sky like cut marble; but the ground was still so sloppy that what I had formerly passed over in two hours now took me three. What is called the "road" consists of I know not how many deep ruts, crossing and anastomosing in a very bewildering way, and so muddy and slippery that my horse preferred stumbling along among the hassocks of *paja blanca* (white grass)—a species of *Stipa* with feather-like silvery panicles tinged with rose—which forms the mass of the vegetation on the paramo. This grass affords excellent thatch; it is also extensively used in packing, and along all the higher grounds it is almost the only material for fuel. Between the hassocks, especially where there are slight declivities, there is an interesting sub-alpine vegetation,—a dense grassy turf is enamelled with flowers, white, yellow, red, and purple, which seem to spring direct from the ground. Three daisy-like *Werneria*, all stemless and solitary, of which *W. nubigena* with its large white stars is the most conspicuous, grow along with a stemless *Valeriana*, a small *Castilleja*, a *Lupinus*, a *Cerastium*, two species of *Gentiana* and two of *Azorella*. The caespitose *Werneria* are true alpine, and grow at 2000 feet above the species just referred to. There are many little lakes, frequently bordered by the swelling, glaucous, sphagnum-like tufts of a *Plantago*, over which creep the silvery threads of a minute *Gnaphalium* and an equally minute white-flowered *Gentiana*. In such situations grow also a small *Ranunculus*, bearing generally a single sessile flower and a pedunculate head of follicles, a *Stachys*, and several other herbs of humble growth. Heath-like tufts of *Hedyotis ericoides*, often accompanied by a suffruticose *Valeriana* of similar habit, and sometimes by a *Calceolaria*, here and there diversify the landscape; while the hassocks shelter in their bosom purple *Lycopodia* and other plants.

Having passed Sanancajas, we descend to the sandy plain of Riobamba, whose general character is the same as that of Ambato, save that cactus-hedges often replace those of aloes.

In Riobamba I remained three days with my hospitable countryman Dr. James Taylor, and then proceeded on my way, going the first day only as far as Miraflores, a farm six leagues away from Riobamba, and near the village of Guamóte. On the way we had to climb over a small space of paramo, where we got the benefit of a storm of hail and sleet. The vegetation was scanty, and I gathered only a minute Umbellifer which was new to me. Miraflores is what is called a cold farm, consisting chiefly of pasture

and barley fields. A short ascent from it brought us upon the Paramo de Tiocajas, which is full six leagues across. Anything more desolate than this paramo I have nowhere seen. It is one great desert of moveable sand, in which the distant patches of *Cacti*, *Hedyotis*, and a succulent *Composita*, only render its nakedness more apparent. Where there is a little moisture, solitary plants of a silky-leaved *Plantago* struggle for existence. The altitude is about the same as that of Sanancajas, and it may be imagined how cheerless was a slow ride of nearly twenty miles over such a waste, rendered all the more gloomy by a leaden sky overhead, and a piercing wind which came laden with mist and fine sand. I was obliged to go nearly at the pace of my loaded beasts, the unsettled state of the country, and the number of deserters from the "constitutional" army roaming about, rendering it unsafe to leave my goods a moment. Yet even such an "Ager Syrticus" has its points of interest, for on this place is seen the dividing of the waters of the Atlantic and Pacific oceans. We passed many small streams, some rising on the paramo, and some in the western Cordillera, but all running eastward to join the Great River, with whose waters and forests I was long so familiar; when, however, we approached the southern side of the paramo, we came on the Rio de Pumacháca (River of the Bridge of Tigers), a considerable stream rising in the eastern Cordillera and running westward towards the Pacific; it is in fact one of the sources of the river Yaguáchi, which enters the gulf of Guayaquil. From the Pumacháca northward, until very near Quito, all the streams of the central plain between the two branches of the Cordillera flow eastward, and unite in the gorge of Baños to form the river Pastusa, which speedily reaches the Amazonian plain, and thence the Atlantic; but the streams around Quito itself unite to form the river of Esmeraldas, and seek the Pacific. Near the Pumacháca there was rather more vegetation; patches of *Cyperaceæ* were dotted with the white flowers of a minute *Lobelia*, which I have seen in many similar situations, and groups of *Cactus* were draped over by an *Atropa*, remarkable for its aromatic leaves. It is singular that in so deadly a genus all the species I have seen in the Quitenian Andes have edible though very acid fruit, and that the shoots are cropped by asses and llamas.

As we descended from the southern side of the paramo, the *Hedyotis* began to be mixed with a small labiate shrub of very similar foliage, and bearing numerous spikes of lilac or violet flowers; and farther down the latter grew so abundantly that it

covered the whole hill-side with a mass of aromatic flowers, which was an agreeable change from the sterile paramo. The road ran parallel to the Pumacháca, but at a vast height above it. It was well on in the afternoon when we reached the village of Ticsán, still in the cool region, and, as we calculated on finding more comfortable quarters in Alausí, which was two leagues ahead, we resolved to try to reach it, which we accomplished just after night-fall, having in the day made ten leagues. With some trouble we succeeded in getting a little food for ourselves; but food for our beasts was of more importance, and we could get none. At four o'clock the following morning I roused my people and sent them out to the neighbouring farms in quest of *alfalfa* (lucerne). They returned bringing a mule-load, which, though an insufficient quantity, was better than none, and we delayed our journey until eight o'clock, in order that the poor animals might eat, for we had this day only five leagues before us.

Our road now turned to the right, while that to Cuenca continues southward and crosses the elevated ridge of Azuáy. We still followed the course of the Pumacháca, which gradually turns westward, and bursts through the Cordillera in a gorge so deep and narrow, that with difficulty has a narrow path been cut along the declivity on the southern side. The whole five leagues from Alausí to Chunchi consists of steep ascents and descents, and of perilous crossings of precipitous slopes, not to be passed without a shudder; for the track is in many places so narrow that two persons mounted could not pass each other without endangering the life of one of them. Fortunately our beasts were sure-footed and the road was dry; in fact, from Ticsán, where we fairly began to descend the western slope of the Cordillera, we found we had got into the height of summer, having left mid-winter behind us at Ambato and Riobamba. The hill-sides were well covered with grass, but all completely withered up by nearly two months of dry weather; so that except near the streams, where there was a margin of scrub or low forest, the eye rested on nothing green.

Alausí stands at about the same height as Ambato, but is subject to still more violent winds, so that even the crops of maize are rarely to be seen standing erect. As a town, it bears no comparison with Ambato either for size or neatness, and, like all the other pueblos of the canton (of which it is the *chef-lieu*), seems to have been for several years in a state of decadence: the houses begin to fall and are merely propped up, not repaired or rebuilt; and yet there are all around valuable farms of wheat and maize.

Throughout the Quitenian Andes a bit of solid rock is rarely seen, save where black, jagged masses of trachyte stand out in the higher peaks, which are all either active or dormant volcanos; and on a superficial view most of the hills seem to be made up of *débris*, either, as around Ambato, of calcined and triturated granite and schists, or, as in descending from Alausí, of stones and rude blocks confusedly heaped together. But in one place we saw above us a low cliff of vertical strata, much cracked and bent, as if by some force applied to their ends. The brown hill-sides began to be diversified by an arborescent *Cactus*, with polygonal stems and white dahlia-like flowers, which, Briareus-like, threw wide into the air its hundred rude arms. Lower down, at about 6000 feet, I saw specimens full 30 feet high and 18 inches in diameter. Along with it grew frequently a *Cæsalpinia* and a *Tecoma*, both of which are abundantly planted near Ambato and Guano, the former for the sake of its bark, used in tanning, and the latter because it bears a profusion of ornamental yellow flowers, and is supposed to possess wonderful medicinal virtues.

About two leagues below Alausí the road descends to the margin of the river, where it meets the Chanchán, a larger stream coming from the eastern Cordillera, near the volcano Sangáy; the two united take the name of the latter, and preserve it until issuing into the plain, where, joined by the Chimbo from Chimborazo, they form the river Yaguáchi, which empties itself into the gulf just above the city of Guayaquil. Crossing the Chanchán by a rude bridge near its junction with the Pumacháca, we entered on a beach clad with a grove of Acacias—low spreading trees with very odoriferous yellow flowers and binate spines sometimes three inches long. Near this place, which was still some 8000 feet above the sea, we came on the first sugar-cane farm. The road again leaves the river, and we had finally to climb a long cuesta to reach the village of Chunchi, which is full 1500 feet above the river.

Chunchi is the last village on the slope of the Cordillera, and I had calculated on making it my head-quarters, though the forest is still a day's journey farther down. I brought recommendations from Ambato, and the people seemed willing to assist me; but the houses were so miserable, so full of dirt and vermin, and so utterly destitute of furniture (for I could procure neither bedstead, chair, nor table), that I saw I should work on my plants with infinitely less comfort than I used to do in a palm-hut in the warm forest. Another and greater difficulty was the procuring of food for my beasts, for all the pastures were dried up, and a man

who sold me alfalfa for two days then told me he could spare no more. About a league from Chunchi and 1000 feet lower down, there is a cane-farm called Guataxí, whose owner, Señor José Leon, I had known in Riobamba. Almost in despair, I rode down to consult with him, and he at once invited me to take up my quarters in the hacienda, where he has a good house, with neatly papered rooms and decent furniture. The cane-grounds extend along the banks of a stream, which before falling into the Chanchán forms a considerable lake, on whose shores there was still a little herbage; besides that a few squares near the house were planted with alfalfa.

On the third day after establishing myself at Guataxí, having procured a guide, I proceeded to Lucmas, a short day's journey lower down the river, where there are a few small chacras tenanted by Indians and zambos. There I was told I should be near the *Cascarilla roja*, and I was recommended to a person called Bermeo, who had worked a good deal at getting out cascarilla and sarsaparilla. I at once secured his services, and, as he turned out an honest active fellow, I took him with me in all my subsequent excursions in the district. From him I learnt that the *Cascarilla roja* did not commence until another day's journey downwards, and that to have a chance of seeing it in any quantity (which, he admitted was, at best, only problematical), it would be necessary to penetrate at least three days into the forest. As my object for the present was merely to make myself acquainted with the plant, and with the soil and climate in which it grows, I decided on going no farther than until I should meet with it; for the procuring and transporting of provisions, necessary for a long stay in the forest, is both difficult and expensive.

I remained a day at Lucmas to look around. It is at an altitude of between 5000 and 6000 feet, and produces luxuriant sugar-cane. The small banana called "Guinéo" flourishes (as indeed it does at Guataxí), but the plantain is near its upper limit, and the fruit is small and scanty. There are tolerably lofty forest trees in the valleys and on the hills, while the steep sides of the latter are often covered with grass, more or less intermingled with scrub, and often with Bromeliaceæ. In descending towards Lucmas, I saw on the bushy hill-sides a great deal of the small tree called "Palo del Rosario," a curious, and I believe undescribed *Sapindacea*, which I had already gathered at Baños in the eastern Cordillera. Its most remarkable feature is, that while the layer of wood next the bark is quite white, all the internal layers are purple-brown

with a black outer edge—a colour not unlike that of old walnuts ; so that articles fabricated of this wood are curiously mottled. Unfortunately the trunk never exceeds a few inches in diameter, so that only small articles can be made of it. I have secured a specimen of the wood, and of spoons made from it, for the Kew Museum.

One of the most frequent trees at Lucmas, and the most valuable for its hard wood (though the young branches are brittle), is an *Escalloniacea*, called “Ignia.” It grows to a good size ; the leaves are narrow-lanceolate and very long—the lower ones always red, and the reddish flowers are borne in long pendulous racemes ; so that the tree has a very pretty aspect. It abounds along the western slope of the Cordillera, and grows at from 5000 to 9000 feet. It is accompanied by an Amyrdeous tree, called “Alubilla,” which the people hold in great dread, as they believe that to touch it or pass beneath its shade is enough to cause the body to swell all over. I had already, at Baños, gathered flowers and fruit of it, and stained my hands with the milk, to the great horror of those who saw me, but without experiencing any ill effects ; and I believe that the swelling attributed to it is owing more to sudden changes of temperature, or to alternate scorplings and wettings, for I have seen such an effect follow where there was no Alubilla. Be this as it may, the young man I took as guide felt one of his eyes begin to swell the day we left Lucmas for Guataxí, and in a few hours he was swollen from head to foot. In two or three days he was quite well again, but there are cases of the swelling lasting a month. As might be supposed, the blame was laid on the Alubilla.

Lucmas takes its name from the abundance of a species of *Lucuma*, producing an edible fruit ; that name is applied to many species of *Lucuma* and *Achras*, all natives of warm or hot countries. Another evidence of the approach to a hot climate was in the existence of a species of *Echites*, twining among the bushes, and in an epiphytal *Marcgraviacea*, quite similar in its long scarlet spikes to *Norantea guianensis*, though the bracts are small patellæ, not elongated sacs, as in that species. A very odoriferous *Citrosma*, with large thin leaves, three together, is known by the name of “Guayúsa,” and is often taken in infusion, like the Guayúsa of Canelos, which, however, is a species of *Ilex*.

There were a good many herbs, of species not seen elsewhere. One *Composita*, with virgate stems 12 feet high, large alternate, lobed leaves, and from each axil a small leafy ramulus bearing at its apex a corymb of white radiate flowers, was very ornamental.

Orchideæ were tolerably abundant, but prettier even than these were two *Bromeliaceæ*; the one seemed at first sight merely a mass of long scarlet flowers growing out of the moss on old trees and stones, for the leaf-sheaths are imbricated into a little bulb, and the blade is reduced to a spine; the other (apparently an *Æchmea*) has broadish soft leaves and large violet flowers looking at a distance more like those of an *Iris* or an *Amaryllidea*.

On the 4th of August my company started for the forest, our destination being the Rio de Puma-cocha, a large stream rising in Azuay and falling into the Chanchán at about 4000 feet altitude, on the farther side of which much Red Bark has been got in former years. We started on horseback, and a mule carried our necessities. My counsel was, to leave the horses, but Bermeo felt sure I should not be able to perform the distance on foot; we had gone, however, a very short way when we found it necessary to cut our way through the forest, for the track had got overgrown in two years that no one had passed along it; nor was it possible without wasting a good deal of time to open a passage overhead so that a man might pass mounted; I therefore preferred going on foot most of the way. We reached the banks of the Puma-cocha at an early hour of the afternoon, but the ford which Bermeo had passed in former years had been destroyed by the falling of a cliff, and in its place we found a deep whirlpool; so with the drift-wood along the banks we set to work to make a bridge where the river was narrowed between two rocks, and when completed carried across it our baggage, saddles, &c. Then, after a long search, we found a place where we could swim the horses over, and by rolling down a good deal of earth and stones we made a way for them to ascend on the other side. Once across, we selected a site for our hut among vegetable-ivory palms, and thatched the hut with fronds of the same. Close by were the remains of a platanal, showing that the spot had formerly been inhabited, and fortunately still bearing a sufficient number of plantains to cook along with our salt meat, during the two days we calculated on remaining there. Our horses were taken to the top of a neighbouring hill, where there was a bed of one of those large succulent *Panicums* called "Gamalote," which afford a very nutritious food for cattle, and were there made fast for the night. Here we slept tranquilly, save that we were occasionally aroused by the snuffing of bears around us; and before daylight Bermeo and his companion were on foot, and making their way through the forest in quest of Cinchona-trees. They returned at seven o'clock,

having found only a single tree standing, and from that one the bark had been stripped near the root, so that it was dead and leafless. We breakfasted, and then I accompanied them into the forest. We followed the track they had already opened, and then plunged deeper in, meeting every few minutes with prostrate naked trunks of the Cinchona, but with none standing. Bermeo several times climbed trees on the hill-sides, whence he could look over a large expanse of forest, but could nowhere get sight of the large red leaves of the Cinchona. At length we began to tire, and we decided on returning towards our hut, making a detour along a declivity which we had not yet explored. We went on still a long time with the same fortune, and were beginning to despair of seeing a living plant, when we came on a prostrate tree, from the root of which a slender shoot, 20 feet high, was growing. My satisfaction may well be conceived, and my first thought was to verify a report that had been made to me by every one who had collected Cascarilla, namely, that the trees had milky juice, which to me was strange and incredible in the *Rubiaceæ*. Bermeo made a slit in the bark with the point of his cutlass, and I at once saw what was the real fact. The juice is actually colourless, but the instant it is exposed to the air it turns white, and in a few minutes red. The more rapidly this change is effected, and the deeper is the ultimate tinge assumed, the more precious is the bark presumed to be. It is rare to find shoots springing from an old root, because the roots themselves are generally stripped of their bark, which, along with the bark from the lower part of the trunk, is known by the name of "*Cascarilla costrona*" (from *costra*, a scab), and is of more value than that from any other part of the tree.

The *Cascarilla roja* seems to grow best on stony declivities, where there is, however, a good depth of humus, and at an altitude of from 3000 to 5000 feet above the sea. The temperature is very much that of a summer-day in London, though towards evening each day cold mists blow down the valley from Azuay; and for five months in the year—from January to May—there is almost unceasing rain.

If the *Cascarilla roja* has been almost extirpated at Puma-cocha, there is still left abundance of *Sarsaparilla*, and of a very productive kind, for Bermeo assured me he had once taken 75 lbs. weight of the roots from a single plant; whereas in Brazil the greatest yield I have heard quoted was a little over 30 lbs. The Puma-cocha species has a round stem and few prickles, while that

most esteemed on the Rio Negro has a triangular stem thickly beset with prickles.

Let me now say a word about the other plants accompanying the *Cascarilla*, and first of the Ivory-palm, which is known throughout the Ecuador by the name of "Cádi." In Maynas two species of *Phytelephas* were tolerably abundant, the one a slender species called "Yarina," and the other much stouter, called "Polo-ponto."* Both were usually stemless, though ancient specimens had a short inclined stem. Neither of them seems to coincide with the *Phytelephas* described by Seemann. But the Cádi seems distinct from all the preceding: it has a stout erect trunk of 15 or 20 feet; the fronds are 30 feet long, and the *pinnæ* are *fastigate by threes or fours* (as in several *Bactrides* and *Astrocarya*), while in the other species they are equidistant; lastly, the *male flowers are racemed on a long pendulous spadix*. The nuts are much the same as in the other species, only rather larger; they are extensively used in the Sierra for making heads of dolls, saints, and walking-sticks. The Cádi produces a very excellent "cabbage," but the Indian and other inhabitants are fonder of a large maggot, called "Majón," which is bred in its trunk. I have seen the Indians of the Rio Negro and of Canelos roast and eat the larva of a beetle extracted from the trunk of the Popunha palm (*Guilielma speciosa*).

A species of *Carludovica* with pinnate aculeate fronds was also frequent. *Triplaris surinamensis*, with its large bunches of triquetrous red fruits, was quite as abundant as on the Amazon; and *Lasionema roseum*, a tree closely allied to the *Cinchona*, grew side by side with the *Triplaris* at Puma-cocha, just as it used to do at Tarapoto.

In general the arborescent vegetation seemed scanty in species and uninteresting. One of the most striking trees was an *Erythrina* with a slender tortuous (almost twining) trunk, from which sprang long spikes of scarlet flowers, and few branches bearing each a coma of ternate leaves, whereof the leaflets were sometimes 18 inches across. There were also a few figs, and on the steep declivities there were patches of low forest, consisting chiefly of *Clusiæ*, *Thibaudiæ* and *Melastomaceæ*. Two small *Trichomanes* crept along the branches of shrubs, but terrestrial ferns were all but absent.

On returning that evening to our hut, I consulted with Bermeo about our ulterior movements. He told me that if I would go

* Most likely "Púlu-puntu" is the original Quichua, as the letter "o" does not exist in that language.

another day's journey into the forest, he could with certainty show me more trees of the *Cascarilla roja*, which he had seen not many months previously, and, as on account of the revolution no one had this year entered the forests to collect *Cascarilla*, it was probable they were still untouched. But for this our stock of provisions would scarcely suffice, and I saw no probability of adding anything interesting to the general collection; besides, I had to visit other forests in quest of other sorts of *Cascarilla*, and I saw the season was already passing for the flowers and seeds of most trees. We therefore on the following day retraced our steps up the valley, and after another day spent at Lucmas in drying my paper and adding what I could to my collection, I returned to Guataxí.

I was unable to move far from the farm for above a fortnight afterwards, on account of the passage of the Government troops from Quito to Cuenca; for their general, to avoid the cold and stormy Azuay, had decided on passing by Guataxí, whence by a rough track through the woods one may come out at Cañar in two or three days. The owner of Guataxí had taken a prominent part in a late rising against the Government—the insurgents had been defeated in a pitched battle on the flanks of Chimborazo, and now the victorious party threatened terrible things—so he judged it expedient to keep out of the way, and to hide all his horses and cattle in the hills. When the troops actually reached Chunchi, I went thither and had an interview with their chief, from whom I exacted a promise (which was faithfully kept) that nothing on the farm should be molested. You would be nowise interested with anything I could tell you of political squabbles here, which, were it not for the occasional bloody episodes and the wholesale robberies under the name of “contribuciones voluntarias,” would seem more like children's quarrels than anything else.

During this interval I was obliged to content myself with the flora of Guataxí. The cane-farm is about 7000 feet above the sea; the maximum temperature each day was generally about 73°, though it once reached 77°, and the minimum temperature varied from 55° to 60°. A plateau, about a thousand feet higher, belongs to the farm, and produces good crops of grain and potatos. The hills adjacent to the farm, except where under cultivation and artificially irrigated, are covered with grass, amongst which the withered remains of a good many annuals were visible. Almost the only annual still flourishing was, singularly enough, a species of *Monnina*, with violet flowers; and, as most of the species of

this genus are trees, I took it for a *Polygala* until I saw the fruit. The "Yerba Taylor" (*Herpestes chamædryoides*, H.B.K.), which has great fame as a remedy for snake-bites, was frequent, but mostly scorched up. Amongst the perennial herbs (most of which were new to me) may be mentioned an *Epilobium*, a *Stachys*, a *Phaseolus*, a *Desmodium*, two *Crotalaria*, a shaggy *Hieracium*, a very pretty *Leria* with large blue flowers, growing on shady banks, and a branched *Composita* with silky-white leaves and handsome purple flowers, besides several *Solanæ*, *Labiata*, *Ehretiaceæ*, and two *Acanthaceæ*, which last order seems entirely absent from the cold region; also a suffruticose *Lantana* with yellow flowers, which I had not seen elsewhere. In moist places a little *Cuphea* was very abundant. The shrubberies consisted chiefly of *Compositæ*, whereof one resembled a *Spiræa* in aspect and in the odour of its numerous small white flowers; but there was also a new *Büttneria*, and the common *Clematis* of the warmer parts of the Cordillera climbed about everywhere.

In cultivated ground, especially in the maize and cane fields, two delicate broad-leaved *Paspala*, called "Achín," spring up in great abundance. Every day I saw the servants of the farm get bundles of them for the cows, pigs, &c., which ate them with greater avidity than even the alfalfa, so that, though weeds, they were nearly as valuable to the owner as the crops amongst which they grew.

Among the trees, which grew chiefly along the banks of the river, were two species of *Lycium* not previously seen, an *Inga*, a *Mimosa*, and a *Bignoniaceæ* with broad opposite leaves and cymes of large purple flowers. The last, known by the name of "Hualla," is frequent in the western Cordillera at from 6000 to 9000 feet, and is one of the best timber-trees. It is not improbably the little-known *Delostoma integrifolium*, Don; but it is not a *Delostoma*, for, besides an essential difference in the calyx, the septum is contrary to the valves, as in *Tecoma*, not parallel to them, as in *Delostoma* and *Bignonia*.

So soon as the last soldier had passed, I put in execution my project of visiting the forests producing the *Cascarilla serrana* or Hill Bark, which is found at 8500–9000 feet on both sides of the river Chanchán. I went first to the forest of Llalla, at the foot of Azuay, and only a little more than two hours' journey from Guatixí. Here there is a cattle-farm and a few Indian chacras, in one of which I established myself. I found a rather interesting vegetation, and this consoled me for my wretched quarters in a hut

dark and smoky, and so low that I could not stand erect. We had happened on a windy time, and as the walls and roof were full of chinks, the violent wind which got up at midnight starved us beneath all our blankets and ponchos. After sunrise there was a brief lull, and then it came on again to blow from the same quarter (west, with a slight touch of northing) and so continued through the day. We had no rain during the five days of our stay, although the storms on the farther side of Azuay often overlap as far as Llalla, so that from Guataxi we could see it raining in this hill-forest, when not a drop fell in the lower grounds; and even when it does not rain the forest is generally enveloped in mist. This constant supply of moisture renders the vegetation more vigorous than in the dry grounds below, and is the cause why the trees are so thickly clad with mosses that it is difficult to push one's way through them. Two mosses, whose long slender stems hang down like a beard from the branches, bore here abundance of fruit, which for two years I had sought in vain in other localities. But I was most pleased to find a moss with large laciniato-ciliate leaves—so novel a feature in this tribe, that I took it for a *Plagiochila*, until I found the capsules nestling amongst the terminal leaves.

To return however to our Cascarillas, of which there are two sorts in Llalla, the one called "Cúchi-cára," or Pig-skin, because dried pieces of the bark resemble morsels of pig's-skin boiled and then grilled (which is a favourite dish in Ecuador). The same bark is sometimes called "Cháucha," a term implying thickness without much consistence; as, for example, in this bark, which shrinks much in drying, and in a sort of large watery potato, called "Chauchas." The other bark is called "Pata de gallinazo," or Turkey-buzzard's foot; it does not peel off freely like the other, and when dried generally occurs in small split fragments, but as it is rather deeper-coloured it is more esteemed than the *Cuchicara*. The same, or similar kinds, are known in other districts as "Cascarilla naranjada." The demand for either kind has of late years been very slight, so that there has not been such destruction of these barks as of the red, and on a stony hill-side not far from the hut I found above twenty large trees of the *Cuchicara*, from 40 to 50 feet high. All had fruited freely this year, but the capsules were already empty, with the exception of one small corymb. In the forest of Yalancáy, on the opposite side of the river and near the road leading from Alausi to Guayaquil, I afterwards found a tree with recent fruit and even a few flowers. The latter are

deep brick-red, and the capsules are usually elongate-oblong, but vary to roundish-oblong. Trees of the *Pata de gallinazo* were scarce, and I did not see any in flower or fruit. Both sorts have the leaves broadly oval, with or without a slight apiculus, and pubescent beneath; but in the *Cuchicara* the petiole and midrib are red, which is not the case with those of the *Pata de gallinazo*, nor do the leaves of the latter turn so red with age. The *Cuchicara* has but few virgate branches, while the other has a denser ramification. The leaves of the *Cascarilla roja* are of almost the same form as in the other two—perhaps slightly narrower—and I confess that if I had been shown the leaves only of all three, I should without hesitation have referred them to the same species. I hope the flowers and fruit may afford clear distinguishing characters. The bark of the *C. roja* is a deep purple-brown when good; that of the other two species a pale cinnamon-colour. It is customary to scrape off the external asperities and lichens in the latter, when the surface remains of a pale or whitish colour, but this is never done with the *Roja*. The *Cascarilla roja* is well known to abound in both quinine and cinchonine, and is considered far more efficacious in the cure of intermittent fevers than the other two, which however are sometimes used in preference when it is desired to avoid the astringent effects of the *C. roja*.

Of the trees growing along with the *Cascarillas* in Llalla the “Motilón” was the most frequent and the largest, attaining sometimes 60 feet high. This is the second species I have gathered under this name: the fruit is an edible drupe, but I hesitate to refer the genus to *Amygdaleæ* until I see the flower. With the Motilon grew, however, a true *Cerasus*, with very large leaves; it had flowers and young fruit. Other trees in the same forest were the *Hualla*, the *Ignia*, a *Berberis*, a *Rhamnus*, a *Nonatelia*, two *Myrtaceæ*, and especially an arborescent *Loranthus*, with dense spikes of fragrant yellow flowers,—the leaves on some ramuli alternate, on others opposite, and on others three together. I had previously gathered it on Tunguragua. There was also a Solaneous tree, allied to *Lycium*, but with dull yellow bignonoid flowers growing from the naked branches, and in its whole habit reminding me much of *Crescentia*. The shrubs included a *Barnadesia*, two *Salviæ*, a sarmentose *Fuchsia*, and most abundant and ornamental an aphyllous *Fuchsia*, epiphytal and (after the manner of a *Cornidia*) climbing high up the trees, which it adorned with its large vermilion flowers.

Patches of verdant pasture were scattered in the forests, and in

these I gathered a stoloniferous *Ranunculus* new to me, a small *Juncus*, a curious *Rubiacea* allied to *Richardsonia*, two *Ionidia*, the one with red the other with scarlet flowers, and some other herbs. In the woods there was also a stinging herb with large white flowers of the N. O. *Loaseæ*.

The *Orchideæ* must not be forgotten—they were very numerous and in fine state, especially two large-flowered *Odontoglossa*, whose liana-like peduncles depended almost to the ground. There were also some *Oncidia* and *Epidendra*, and many curious things whose affinities I did not recognize, and which I have not yet examined.

From Llalla I despatched my men to the adjacent paramos on that side of Azuay, with instructions to bring me everything they found in flower. They returned bringing a good many alpinos, including some pretty *Senecios* not elsewhere seen, a red-flowered cæspitose *Werneria*, a small *Crucifera*, an *Alstræmeria*, a *Gnaphalium*, but especially a beautiful *Gentiana*, allied to *G. cernua*, and instead of having only one or two pendulous flowers, as in that species, bearing a profusion of erect pyriform red flowers. It is called "Rocotilla" by the inhabitants, from the similarity of its flower to the fruit of a species of *Capsicum* called "Rocote," which is cultivated throughout the cold region.

I have only a few more words to say about the Cascarillas. I have conversed with many people who have worked on the *C. roja*, and all profess to know of places where large trees were left standing last year. As no one has entered into the trade in this present year, those trees may have borne a crop of seeds, from which by next year a number of young plants will have sprung up. They offer also to take me to places where there are beds of young plants of two or three years' growth. In the forests about the foot of Chimborazo I am told that those who cut down bark-trees break off the young branches and stick them into the ground, where most of them take root—a very laudable practice if the effect be such as is stated. It would appear from this that cuttings might be safely tried. I planted two sprigs of the *C. roja* in Bermeo's garden at Lucmas, which were growing when I last heard of them. From what I have this year seen, it appears that the *Cinchonas* flower at the end of the rainy season—that is in May—and have ripe seeds in July, like a great many other trees. May is the earliest month in which the forest could be entered, and even then not without difficulty and risk. I have made out that the town of Milagro, from which Guayaquil can be reached in a day by navigating the river Yaguachi, would be a

convenient dépôt for the seeds and young plants got out in the forests of Pumacocha, which are three days' journey above. The road is, however, so narrow and bad that there would be small chance of getting live plants down to Milagro in boxes or baskets, either on mules' or men's backs, and I see no other way than putting each plant into a bamboo, where it would travel in perfect safety.

In a farm called Piñancay, adjoining Guataxi, I became acquainted with the owner, Dr. Najera, a very intelligent man, and formerly deputy to the Congress. He has a cattle-farm on the eastern side of Azuay, at the head of the river Jubál; and in a day's journey down that river a forest is reached in a temperate clime, where a great deal of excellent bark has been collected, esteemed nearly equal to the *Cascarilla roja*. This bark is known as "*Cascarilla acanelada*," and Dr. Najera describes the tree as having a small shining leaf, like that of the orange. In this month or the next the rainy season will be over on the eastern side of Azuay, and if I receive my orders in time, I propose going thither with Dr. Najera in January, when it will be midsummer there, and the *Cascarilla acanelada* should be ripening its seeds. I fear there is no chance of getting young plants alive to the coast, across the ridge of Azuay, 15,000 feet and more in height.

Ambato, Republic of Ecuador,
Oct. 20, 1859.

Notice of the Discovery of *Lastrea remota* in England. By THOMAS MOORE, Esq., F.L.S., F.H.S.

[Read Dec. 15th, 1859.]

IN the course of the past summer, Mr. F. Clowes of Windermere sent me a frond of a fern found by him in the Westmoreland lake district, doubtfully labelled *Lastrea Filix-mas*, v. *incisa*; and he observed that for some years it had been considered to belong to *Lastrea spinulosa*. A specimen subsequently sent, when in a more fully developed state, led to a comparison with the *Aspidium remotum*, A. Br., for a frond of which I am indebted to Professor Mettenius of Leipsig, and this comparison proved the German and Westmoreland plants to be of the same kind.

This *Aspidium remotum* had been first noticed by Braun* as a variety of *Aspidium rigidum*, but it was subsequently regarded by

* A. Br. in Döll. Rhein. Fl. 16.

him as a distinct species, and was described under the name of *Aspidium remotum* *. It has subsequently been adopted as a species by Kunze†, by Fée‡, by Mettenius§, and by Koch||. Braun's plant, as far as I am aware, has hitherto only been recorded as a native of Southern Germany, to which must now be added the English habitat of Windermere, Westmoreland.

In general character and aspect the plant very much resembles the vigorous examples of *Lastrea spinulosa* which are sometimes met with, having like that fern narrow elongate erect fronds; but its structure agrees more closely with that of *L. Filix-mas*, than which, however, it is once more divided. It has neither the appearance nor the structure of *L. rigida*. The plant appears to me to have very reasonable claim to specific rank, though on this point it is in these days hopeless to expect unanimity of opinion.

I append the specific character and synonymy of this addition to the British flora, together with a full description of the Westmoreland plant.

LASTREA REMOTA: fronds oblong-lanceolate, subtripinnate, smooth; pinnæ acuminate, distant below; pinnules distinct, pyramidal or ovate-oblong, acute, shortly petiolate below, sessile, with a narrow attachment, or more or less adnate upwards, the basal ones pinnatifid almost to the costa; lobes oblong, blunt, serrated, the serratures acute mucronulate; sori copious over the whole frond, biserial near the costa; indusium reniform, obscurely eroso-dentate, persistent, without glands; stipes and rachis stout, scaly.

Lastrea remot, Moore, *Index Filicum*, 102.

Aspidium remotum, A. Braun, *Verjung*. 330; Kze. *Linn.* xxiii. 230;

Fée, *Gen. Fil.* 291; Metten. *Fil. Hort. Bot. Lips.* 93; *id. Aspid.* 57.

Aspidium rigidum, β. *remotum*, A. Braun, *Döll. Rhein. Fl.* 16.

Polystichum remotum, Koch, *Syn.* 2 ed. 979.

Hab. Windermere, Westmoreland (*F. Clowes*, 1859).

Caudex..... *Stipes* a foot long, stout, clothed with numerous scales of various size, some ovate-acuminate, $\frac{3}{4}$ of an inch long, others smaller, lanceolate or linear, terminating in a lengthened hair-like point, the margins slightly wavy or toothed; along with these larger ones occur numerous others, which are minute, ovate caudate, and peltately attached. *Rachides*, both primary and secondary, furnished with scales, which become smaller upwards. *Fronds* (including stipes) 3-4 feet high, erect, narrow, oblong-lanceolate, smooth, subtripinnate. *Lower pinnæ* 3-4 inches long, ovate acuminate; central ones 6 inches long, linear-oblong acuminate, all ascending, opposite or subopposite, and

* Braun, *Verjung*. 330.

† Kze. *Linn.* xxiii. 230.

‡ Fée, *Gen. Fil.* 291.

§ Mett. *Fil. Hort. Lips.* 93; *id. Aspid.* 57.

|| Koch, *Syn.* 979.

distant below. *Pinnules* (basal ones of second pair of pinnæ) $1\frac{1}{2}$ inch long, shortly stalked, pyramidal or pyramidal-ovate, acute, pinnatifidly divided nearly to the costa, almost pinnate; lobes oblong, obtuse, about $\frac{3}{8}$ inch long, the lowest ones sublobate at their base, otherwise toothed or serrated; the serratures most numerous and prominent at the apex, acute and mucronulate. The pinnules become gradually less pyramidal or ovate, and more oblong, at length linear-oblong as they recede from the main rachis; below, except in the case of the lowest, they are also sessile with a narrowed attachment, but become gradually more and more adnate upwards. The pinnules of the upper pinnæ resemble the smaller pinnules of the lower ones. *Venation* in the larger lobes, consisting of a flexuous primary vein or costule, from which alternate veins proceed towards the serratures of the margin, sometimes becoming branched; the sori are situated medially on the simple veins, and close above the fork on the branched ones. In the smaller pinnules the costule bears a sorus medially on its lowest anterior vein, so that a row of sori are formed on each side of and near to the costa; the basal lobes often bear in addition two or three more sori, and are traversed by a series of alternate simple veins. *Fructification* occupying the whole back of the frond from the base to the apex. *Sori* prominent, distinct, biserial near the costa of the pinnules, and in the larger ones biserial on the lobes. *Indusium* persistent, reniform, obscurely eroso-dentate on the margin, not glandular.

Notes upon the British Herbarium of the Linnean Society.

By DANIEL OLIVER, jun., Esq., F.L.S.

[Read Dec. 15th, 1859.]

It has occurred to me that, from the interest felt in British Botany by many members of the Linnean Society, it might not be amiss to present, in the form of a little notice, in the 'Journal of Proceedings,' a short account of the Herbarium devoted to our own Flora, upon which, at the request of the Herbarium Committee of the Council, I have been engaged, at intervals, within the past two years.

That the formation of such an Herbarium was contemplated, and had indeed considerably progressed, may be gathered from the allusion to it in a late Anniversary Address of our President*, and from its cursory mention in the published 'Minutes of Proceedings.' It has not hitherto, however, been thought needful or desirable to appeal to Fellows for assistance in the contribution of

* Journal of Proceedings, vol. iii. p. xx., 1858.

desiderata, chiefly because it was, in the first place, to be ascertained how far the extensive collections already in the possession of the Society might furnish suites of specimens sufficiently ample for the complete illustration of the various species, and, further, from the probability that a great portion of such desiderata as might remain, especially among the more critical groups, as the *Rubi*, *Salices*, &c., would be supplied to us by Fellows of the Society who have devoted their special attention to the study of such groups, and whose labels bear a high authenticity.

I shall briefly state the extent to which we have, to this time, been able to carry out the design of rendering this collection a thoroughly standard one, and as complete as possible in respect to representatives, not only of each recognized British species, but of each marked form or variety. I ought here to say, that from the very limited accommodation which the Society can afford to this Herbarium, it was early apparent that it would be out of the question to attempt to make it illustrate, in anything like completeness, the geographical distribution of the respective species through our islands; yet in the selection of the required specimens those have been laid in by preference which at the same time indicated by their labels a different locality or extension of area.

The collections which have been accumulating in the Society's rooms over many years have furnished the important nucleus of the present Herbarium; these have been successively gone over, and such examples selected from them as seemed suited to the object in view. Of these collections by far the most important, and affording the great proportion of select specimens, was that bequeathed to the Society by the late N. J. Winch of Newcastle-on-Tyne, an excellent local botanist, and author of one of the best of the older Floras—that of the counties of Northumberland and Durham, published in the 'Transactions of the Natural History Society of Newcastle.'

From a condition in his bequest we are not permitted to remove his specimens from the paper upon which they are mounted, nor to glue down upon the same sheet additional examples; hence between these and the papers now in use, uniform in size but superior in quality, a difference is sufficiently obvious*. From time to time, however, these specimens, which at present form perhaps the major part of our collection, may be removed, if thought desirable, on the substitution of other and yet better examples.

* Contributions to the British Herbarium, to which conditions are annexed limiting the Council in their absolute disposal, cannot in future be accepted.

As might be expected, Winch's Herbarium was rich in North of England plants; of these, his fasciculi of Roses and Willows were particularly extensive: it contained also many rare species from other quarters, received from his correspondents or collected by himself on his longer excursions. A second collection in the Society's keeping was that of the late Dr. Withering, author of the 'Botanical Arrangement of British Plants,' presented to the Society by Beriah Botfield, Esq., F.L.S., grandson of the Doctor. In this Herbarium, deserving of especial attention, was a series of specimens, many of them of infrequent or rare species, collected by the late Robert Brown, near the close of last century, in Scotland and Northern Ireland. These are peculiarly interesting from the valuable notes which accompany them, in Mr. Brown's handwriting. They bear most striking testimony to the early development of his well-known habits of close, sagacious observation and minute accuracy. These were mostly gathered from the year 1791 to 1794, from about the eighteenth to the twenty-first years of his age.

From these herbaria, and also from minor collections formed by Woodward, Relhan, Maton, Dickson, and Don, with packets contributed from time to time by various collectors, a considerable selection of specimens has been made, and amongst them are several which, from their increasing rarity or actual disappearance from within our borders, or from other circumstances, are more particularly noteworthy. Of such we find *Sonchus palustris*, L. (Kent, Cambridge), *Senecio paludosus*, L. (Lakenheath), *Frankenia pulverulenta*, L. (Sussex), *Caucalis latifolia*, L. (Newmarket), *Cypripedium calceolus*, L. (Castle Eden Dene, and Helk's Wood, Ingleboro'), *Carex Davalliana*, Sm. (near Bath), *Eriophorum alpinum*, L. (Restennet, near Forfar, R. Brown), *Elymus geniculatus*, Curt. (near Greenwich, Dickson), *Potentilla tridentata*, Sol. ("East Rocks, Loch Brandy," Don), *Epimedium alpinum*, L. (Hb. Withering, marked "Mr. Robson, from Skiddaw," &c., and Carrock Fell, Cumberland, 1787), *Orchis hircina*, Scop. (Dartford), and *Anthemis anglica*, Sm. (Sunderland, Robson*).

Besides the collections above enumerated, which were examined in the course of last year, we have received recently from Mr. Salter the liberal present of the herbarium formed by his brother, the late Dr. T. B. Salter of Ryde: in addition to an admirable collection of British *Rubi*, very valuable in connexion with his

* I note these as I find them, not forgetful of the observations upon some of them in 'Cybele Britannica.'

Monograph published in the 'Botanical Gazette' (vol. ii. pp. 113, 147), numerous specimens have been laid in from it belonging to other families; and thus in the case of species likewise occurring in the northern counties, obtained from the Winch collection, we have been assisted a little step in the illustration of their geographical extension. Mr. Babington has also presented a large and important parcel, consisting chiefly of rare species, with many of the critical plants which so much occupy the attention of British botanists*. Especially for this addition to the collection, and also for the time and care which Mr. Babington has devoted to going through the Society's Herbarium in order to check the nomenclature, not a little of its value is due.

A few large and difficult genera yet remain to be worked up with reference to our present knowledge; these will probably be undertaken by competent botanists before long. The *Rubi* Mr. Babington has consented to label in accordance with the names to be adopted in his forthcoming Monograph of the British species.

With regard to the mode of arrangement adopted, the paper employed for mounting upon measures about $14\frac{1}{2}$ by $9\frac{1}{2}$ ins., too small, perhaps, but necessarily uniform with that of the Smithian Herbarium contained in the adjoining cabinet. The sheets are marked for ready reference near the right-hand bottom corner, with the number of the species in the 'London Catalogue of British Plants,' which we have made use of as a convenient index to the collection. The mounted specimens are placed in folded sheets of tinted card-board "genus-covers;" these are also numbered consecutively, corresponding to a second numbering (of the genera) in the bound and interleaved copy of the 'Catalogue' kept on one of the lower shelves. The covers slide into fixed partitions measuring about 6 inches in depth, over which the doors of the beautifully constructed cabinet closely shut. The marks suggested by Jos. Woods in his 'Tourist's Flora' are made use of to indicate in the 'Catalogue' the more or less perfect state of the specimens representing each species respectively. Care has been taken to have all the plants poisoned before being laid away.

It may not be out of place to add that, with a view to the further completion of the Society's great Indian Herbarium, the valuable collection formed in Java and Sumatra by the late

* A second packet, since received from the same gentleman, contains a nearly complete set of his "*Rubi*."

Dr. Horsfield, and recently presented to the Linnean Society by the East India Company, has been, within the past few weeks, poisoned, mounted, and arranged.

The species already described by Messrs. Bennett and Brown in the 'Plantæ Javanicæ Rariores,' and also to a considerable extent those of Professor Miquel in the 'Flora Indiæ Batavæ,' have been written up with their respective references. A number of the specimens have been labelled by Miquel himself. The collection is, at present, placed in a cabinet immediately adjoining that containing the Wallichian Herbarium, to which it may be regarded as supplementary.

On the *Rosa rubella* of Winch. By JOHN HOGG, Esq., F.R.S.,
F.L.S.

[Read Dec. 1st, 1859.]

ABOUT the summer of 1823, I discovered in a hedge on the south of the lane leading from Carlton to Norton, in the county of Durham, a rose which had so much of the general appearance of *Rosa spinosissima* that I then considered it to be a *variety* of that species,—only that it had *pink* flowers; I therefore named it, in my short 'Catalogue of Plants' which was published a few years afterwards in Brewster's 'History of Stockton,' as "*Rosa spinosissima*, var. flore *rubro*." Many plants of that species were also growing near the same spot. Some years afterwards, at the request of Mr. Winch, I again made search for that rose, and after a lapse of some two or three years I rediscovered the plant in blossom, having *pink* flowers; I sent a specimen to Mr. Winch, and he informed me that it was *Rosa rubella*.

Two years ago the late Mr. Storey, of Newcastle-on-Tyne, an able botanist, who was engaged in making a more accurate list of the plants indigenous in the counties of Durham and Northumberland, asked me to forward him specimens both in flower and in fruit (in the autumn). In 1857 and 1858 I duly investigated that part of the lane where I remembered that the plant from which I sent Mr. Winch the specimen was growing, but I only found what I thought was the same plant, although not in flower, or in fruit, in either of those years.

In June, however, of this year I was extremely pleased to behold one of the same plants in blossom, bearing two flowers of a lovely blush, or *pink* colour, of which the dried specimen I now

exhibit was one. The second flower I sent to Newcastle; and very near this bush, I found a second plant with three buds—not expanded—but evidently of the same rose, as the flower-buds were tinted at the ends, and in lines on the back of the folded petals with deep *pink*. The bud also exhibited is from this second shrub. I gathered all the flowers and buds, and thus I was unfortunately prevented from ascertaining this autumn the colour of the fruit.

One of the chief differences between the *R. spinosissima* and *R. rubella*, is that the fruit of the former, at first *red*, becomes when mature *black*, whilst that of the latter is said to continue *red* when ripe (see fig. 3. plate 2601, English Botany); this last is likewise distinguished by some botanists as being *pendulous*. Having last week examined the specimens of the *R. rubella* preserved in Mr. Winch's herbarium, I must say that the fruit there dried presents neither of these characters, but it is *black*, or purlish-black, and its stalk is straight, and by no means drooping or pendulous. I also noticed that my specimen was less set with glandular bristles on the flower-stalks than that of Mr. Winch's specimens; but the size and shape of the petals appeared much the same. Further, some of the leaflets, as in mine, have simple serratures, while others show a doubly serrated margin; and in both, the insides of the sepals are downy.

The flowers in my specimens when fresh were of a lovely pink, and in size are larger than the flowers of the *R. spinosissima*, with the petals more notched; but the colours of the flowers of *R. spinosissima* I have never seen other than *white*, or *yellowish-white*. My specimens seem, from the fewer bristles on the flower-stalks, to be rather intermediate between *R. spinosissima*, whose flower-stalks are *smooth*, and the *R. rubella* of Winch's herbarium. Compare also the figures in *plate 187* and *plate 2521* of the 'English Botany.'

I will leave for the consideration of those who are more familiar with the *Rosaceæ*, whether the *R. rubella* be really a *distinct* species.

MR. BENTHAM'S NOTE ON HOMALIUM.

In drawing up my synopsis of the genus *Homalium* (p. 38), I had unfortunately overlooked M. L. B. Tulasne's "Floræ Madagascariensis Fragmentum Alterum," in the 'Annales des Sciences Naturelles,' sér. 4, Botanique, vol. viii. p. 58, where five new species of *Blackwellia*, all from Madagascar, are described. I have not seen any specimens, so as to compare them with my own species; I can, therefore, now merely give here the list, with the affinities suggested by the perusal of the descriptions.

B. brachystylis (Tul. in Ann. Sc. Nat., sér. 4, vol. viii. p. 59), evidently closely allied to *B. axillaris*, Lam., or my *Homalium axillare*.

B. Thuarsiana (Tul. l.c. p. 60), evidently very near to *B. paniculata*, Lam., or *H. paniculatum*, Benth.

B. eriantha (Tul. l.c. p. 62) must also be closely allied to the same species.

B. micrantha, Bois. (Tul. l.c. p. 63), seems to differ in its slender racemes and smaller flowers with broader sepals and petals.

B. planiflora, Bois. (Tul. l.c. p. 64), probably differs still more in having the petals broader, longer, and more obtuse than the sepals.

G. B.

INDEX.

	Page
<i>Abies, Mill.</i>	4-8
— <i>alba, Mill.</i>	1, 14, 15, 16
— <i>balsamifera, Mich.</i>	1
— <i>nigra, Mich.</i>	15
<i>Acanthaceæ</i>	25
<i>Acaulon apiculatum, Hook. f. & Wils.</i>	71
<i>Acer Negundo, L.</i>	9
<i>Achras, L.</i>	183
<i>Acrostichum, L.</i>	22
— <i>aureum, L.</i>	22
<i>Actinia, L.</i>	21
<i>Adansonia digitata, L.</i>	21
<i>Adiantum, L.</i>	22
<i>Agave, L.</i>	177
<i>Akentra, Benj.</i>	175, 176
— <i>inflata, Benj.</i>	176
<i>Algæ</i>	101
<i>Alnus Americana</i>	8
<i>Alstroemeria, L.</i>	191
<i>Andræa acuminata, Mitt.</i>	64
— <i>alpina, Hedw.</i>	64
— <i>asperula, Mitt.</i>	65
— <i>montana, Mitt.</i>	64
— <i>nitida, Hook. f. & Wils.</i>	64
— <i>petrophila, Ehrh.</i>	64
— <i>subulata, Harv.</i>	64
<i>Androsace, L.</i>	9, 16
<i>Anemone patens, L.</i>	8
<i>Angiopteris evecta, Hoffm.</i>	22
<i>Angræcum, Pet. Th.</i>	22
<i>Anictangium bulbosum, Hedw.</i>	96
— <i>repens, Hook.</i>	79
<i>Annonaceæ</i>	25
<i>Annona muricata, L.</i>	20
<i>Anthemis Anglica, Smith</i>	196
<i>Apocynæ</i>	25
<i>Aquilegia, L.</i>	16
<i>Arnica, L.</i>	16
<i>Aroidæ</i>	22
<i>Artemisia, L.</i>	16
<i>Artocarpeæ</i>	18, 21
<i>Aspidium, Swartz</i>	16
— <i>remotum, A. Braun</i>	192, 193
— <i>rigidum, A. Braun</i>	192, 193
<i>Asplenium, L.</i>	22
— <i>crenulatum, Presl</i>	22
— <i>lucidum, Forst.</i>	22
<i>Astomum cylindricum, Mitt.</i>	70
<i>Astragalus, L.</i>	9, 13, 14

	Page
<i>Astranthus, Lam.</i>	35, 38
— <i>Cochinchinensis, Lour.</i>	38
— — — — —, <i>Hook.</i>	35
<i>Astrocarya, Mart.</i>	186
<i>Atrichum ligulatum, Mitt.</i>	97
<i>Atropa, L.</i>	179
<i>Attalea, Mart.</i>	58, 62
— <i>funifera, Mart.</i>	58, 62
<i>Aulacomnion Gaudichaudi, Mitt.</i>	94
<i>Avicennia, L.</i>	22
<i>Azolla Nilotica</i>	25
<i>Azorella, R. & Pav.</i>	178
<i>Bactris, Jacqu.</i>	186
<i>Balsamina fasciculata, Dec.</i>	120
— <i>minor, Dec.</i>	123
<i>Barbula mnioides, Schwægr.</i>	72
<i>Barnadesia, Lam.</i>	190
<i>Bartramia acerosa, Hampe</i>	81
— <i>affinis, Hook.</i>	82
— <i>appressa, Hook. f. & Wils.</i>	81
— <i>fragilis, Mitt.</i>	81
— <i>gigantea, Schw.</i>	85
— <i>Halleriana, Hedw.</i>	80
— <i>Mossmaniana, C. Müll.</i>	80
— <i>papillata, Hook. f. & Wils.</i>	81
— <i>pendula, Schwægr.</i>	83
— — — — —, <i>Hook. f. & Wils.</i>	82
<i>Bassia Parkii, G. Don</i>	19, 169
<i>Begonia, L.</i>	21
— <i>Fischeri</i>	21
— <i>nitida, Dryand.</i>	21
— <i>ulmifolia, Humb.</i>	21
<i>Berberis, L.</i>	190
<i>Betula papyracea, Sol.</i>	1, 15
— <i>pumila, L.</i>	2, 15
<i>Bignonia, L.</i>	188
<i>Blackwellia, Lam.</i>	31, 34, 200
— <i>Africana, Hook. fil.</i>	35
— <i>axillaris, Lam.</i>	34, 200
— <i>brachystylis, Tul.</i>	200
— <i>caryophyllacea, Zoll. & Mor.</i>	38
— <i>cerasifolia, Vent.</i>	38
— <i>Chinensis, Steud.</i>	35
— <i>eriantha, Tul.</i>	200
— <i>foetida, Wall.</i>	37
— <i>fagifolia, Lindl.</i>	35
— <i>glauca, Vent.</i>	34
— <i>gracilis, Blum.</i>	34
— <i>grandiflora, Miq.</i>	38
— <i>integrifolia, Lam.</i>	34

	Page		Page
<i>Blackwellia longiflora</i> , <i>Miq.</i>	38	<i>Ceratopteris thalictroides</i> , <i>Brongn.</i>	25
— <i>Loureiri</i> , <i>Benth.</i>	35	<i>Chryshymenia rosea</i>	104
— <i>mierantha</i> , <i>Bois.</i>	200	<i>Cinchona</i> , <i>L.</i>	176, &c.
— <i>Moluccana</i> , <i>Blum.</i>	38	<i>Citrosma</i> , <i>R. & Pav.</i>	183
— <i>Nepalensis</i> , <i>DC.</i>	34	<i>Clematis</i> , <i>L.</i>	188
— <i>padiflora</i> , <i>Lindl.</i>	35	<i>Clerodendrum splendens</i>	22
— <i>paniculata</i> , <i>Lam.</i>	34, 200	<i>Clusia</i> , <i>L.</i>	186
— <i>planiflora</i> , <i>Bois.</i>	200	<i>Clusiaceæ</i>	24
— <i>rufescens</i> , <i>Arn.</i>	34	<i>Clutia</i> , <i>L.</i>	26
— <i>spiralis</i> , <i>Wall.</i>	35	— <i>Cascarilla</i> , <i>L.</i>	26–30
— <i>tetrandra</i> , <i>Wight</i>	35	— <i>Eluteria</i> , <i>L.</i>	26–30
— <i>Thuarsiana</i> , <i>Tul.</i>	200	<i>Coffea Arabica</i> , <i>L.</i>	19
— <i>tomentosa</i> , <i>Vent.</i>	34	<i>Cola</i> , <i>R. Br.</i>	18
— <i>Zeylanica</i> , <i>Gardn.</i>	35	— <i>acuminata</i> , <i>R. Br.</i>	18
<i>Blindia acuta</i> , <i>Bruch & Sch.</i>	68	<i>Codium Bursa</i> , <i>Ag.</i>	104
<i>Bolbophyllum</i> , <i>Pet. Th.</i>	22	<i>Combretaceæ</i>	22
<i>Breutelia affinis</i> , <i>Mitt.</i>	82	<i>Combretum butyrosu</i> m, <i>Car.</i>	167,
— <i>comosa</i> , <i>Mitt.</i>	82		168, 169
— <i>consimilis</i> , <i>Mitt.</i>	83	<i>Conostomum australe</i> , <i>Swartz</i> . . .	81
— <i>divaricata</i> , <i>Mitt.</i>	83, 84	— <i>pusillum</i> , <i>Hook. f. & Wils.</i>	67, 81
— <i>dumosa</i> , <i>Mitt.</i>	82	<i>Cordylanthus frutescens</i> , <i>Bl.</i> . . .	38
— <i>elongata</i> , <i>Mitt.</i>	83	<i>Cornidia</i> , <i>R. & Pav.</i>	190
— <i>pendula</i> , <i>Mitt.</i>	82, 83	<i>Crescentia</i> , <i>L.</i>	190
— <i>plicata</i> , <i>Mitt.</i>	83	<i>Crotalaria</i> , <i>L.</i>	188
— <i>Sieberi</i> , <i>Hornsch.</i>	83	<i>Croton</i> , <i>L.</i>	26
<i>Bruchia minuta</i> , <i>Mitt.</i>	65	— <i>balsamiferum</i> , <i>Jacqu.</i>	30
<i>Bryum atropurpureum</i> , <i>auct.</i>	84	— <i>Cascarilla</i> , <i>Benn.</i>	20–30
— <i>Billardieri</i> , <i>Schwagr.</i>	84	— —, <i>Woodv.</i>	30
— <i>bimum</i> , <i>Schreb.</i>	84	— <i>Eleuteria</i> , <i>Benn.</i>	26–30
— <i>cæspiticiu</i> m, <i>Hedw.</i>	84	— —, <i>Swartz</i>	30
— <i>crassum</i> , <i>Hook. f. & Wils.</i>	84	— <i>lineare</i> , <i>Jacqu.</i>	26, 30
— <i>dichotomum</i> , <i>Hedw.</i>	84	— <i>lucidum</i> , <i>L.</i>	30
— <i>lævigatum</i> , <i>Hook. f. & Wils.</i>	84	— <i>niveu</i> m, <i>Jacqu.</i>	27
— <i>Tasmanicu</i> m, <i>Hampe</i>	84	— <i>Sloanei</i> , <i>Benn.</i>	30
— <i>torquescens</i> , <i>Br. & Sch.</i>	84	<i>Cryphæa crenulata</i> , <i>Mitt.</i>	90
— <i>truncorum</i> , <i>Brid.</i>	84	— <i>dilatata</i> , <i>Mitt.</i>	90
— <i>vagans</i> , <i>Hook. f. & Wils.</i>	82	— <i>Mülleri</i> , <i>Mitt.</i>	90
<i>Buxbaumia indusiata</i> , <i>Brid.</i>	96, 97	— <i>patens</i> , <i>Hornsch.</i>	90
— <i>Tasmanica</i> , <i>Mitt.</i>	96	— <i>Tasmanica</i> , <i>Mitt.</i>	90
<i>Cactus</i> , <i>L.</i>	178, 181	<i>Cuphea</i> , <i>P. Br.</i>	188
<i>Caladium bicolor</i> , <i>Vent.</i>	22	<i>Cyathophorum bulbosum</i> , <i>Mitt.</i> . .	96
<i>Calceolaria</i> , <i>L.</i>	178	<i>Cypripedium calceolus</i> , <i>L.</i>	196
<i>Calamus</i> , <i>L.</i>	23	<i>Daltonia Novæ-Zelandiæ</i> , <i>Mitt.</i> . .	95
— <i>secundiflorus</i> , <i>Pal.</i>	24	— <i>splachnoides</i> , <i>Hook. & Tayl.</i> . .	95
<i>Callithamnion roseu</i> m, <i>Lyngb.</i>	102	<i>Darea cicutaria</i> , <i>Willd.</i>	20
<i>Campylopus pallidus</i> , <i>Hook. f. & Wils.</i>	69	<i>Delostoma</i> , <i>Don</i>	188
<i>Canna Indica</i> , <i>L.</i>	22	— <i>integrifolium</i> , <i>Don</i>	188
<i>Carex</i> , <i>L.</i>	9, 13	<i>Desmatodon nervosus</i> , <i>Brid.</i> . . .	71
— <i>Davalliana</i> , <i>Smith</i>	196	<i>Desmodium</i> , <i>Dec.</i>	188
<i>Carica Papaya</i> , <i>L.</i>	20	<i>Dicranum angustinerve</i> , <i>Mitt.</i> . . .	68
<i>Carludovica</i> , <i>R. & Pav.</i>	186	— <i>Billardieri</i> , <i>Schwagr.</i>	68, 69
<i>Carpomitra Cabrerae</i> , <i>Clem.</i>	103	— <i>brachypelma</i> , <i>C. Müll.</i>	68
<i>Castilleja</i> , <i>Lam.</i>	178	— <i>dicarpon</i> , <i>Nees</i>	68
<i>Catharinea Mülleri</i> , <i>C. Müll. & Hampe</i>	97	— <i>Drummondii</i> , <i>C. Müll.</i>	66
<i>Caucalis latifolia</i> , <i>L.</i>	196	— <i>flexuosum</i> , <i>C. Müll.</i>	69
<i>Cerastium</i> , <i>L.</i>	178	— <i>introflexum</i> , <i>Hedw.</i>	69
<i>Cerasus</i>	190	— <i>leucolomoides</i> , <i>C. Müll.</i>	68
<i>Ceratophyllum vulgare</i> , <i>L.</i>	25	— <i>Menziesii</i> , <i>Tayl.</i>	68
		— <i>nodosum</i> , <i>Beaur.</i>	69
		— <i>pallidum</i> , <i>Br. & Sch.</i>	69

	Page		Page
<i>Dicranum pungens</i> , <i>Hook. f. & Wils.</i>	68	<i>Fucus serratus</i> , <i>L.</i>	105
— <i>pyriforme</i> , <i>Mitt.</i>	69	— <i>vesiculosus</i> , <i>L.</i>	105
— <i>reflexum</i> , <i>C. Müll.</i>	69	<i>Fumaria agraria</i> , <i>Lag.</i>	157
— <i>robustum</i> , <i>Hook. f. & Wils.</i>	68	— <i>agraria</i> , <i>Mitt.</i>	165
— <i>torfaceum</i> , <i>Mitt.</i>	69	— <i>Bastardi</i> , <i>Bor.</i>	165
— <i>torquatum</i> , <i>Mitt.</i>	69	— <i>Boræi</i> , <i>Jord.</i> 158, 159, 160, 163, 164, 165, 166	
<i>Di ymodon cyathicarpus</i> , <i>Mitt.</i>	70	— <i>capreolata</i> , <i>Bab.</i>	165, 167
— <i>Lapponicus</i> , <i>Mitt.</i>	70	— —, <i>Curt.</i>	163, 164
— <i>longifolius</i> , <i>Hook. f. & Wils.</i> 67, 68		— —, <i>Fries</i>	166
— <i>Mougeoti</i> , <i>Mitt.</i>	70	— —, <i>Hamm.</i>	163
— <i>papillatus</i> , <i>Hook. f. & Wils.</i>	70	— —, <i>Leight.</i>	163, 166
— <i>purpureus</i> , <i>Hedw.</i>	69	— —, <i>L.</i>	157–167
— <i>Tasmanicus</i> , <i>Mitt.</i>	70	— —, <i>Smith</i>	164, 166
<i>Diplazium</i> , <i>Swartz</i>	22	— —, <i>Webb</i>	157
<i>Disodon plagiopus</i> , <i>C. Müll.</i>	80	— <i>confusa</i> , <i>Jord.</i> 158, 159, 160, 161, 165, 166	
<i>Distichium capillaceum</i> , <i>Hook. f. & Wils.</i>	66	— <i>media</i> , <i>Hamm.</i>	164, 165, 166
<i>Draba</i> , <i>L.</i>	16	— <i>muralis</i> , <i>Sond.</i> 157, 158, 159, 160, 161, 162, 164, 166	
<i>Dryas octopetala</i> , <i>L.</i>	16	— <i>officinalis</i> , <i>L.</i>	161, 164
<i>Drynaria</i> , <i>Bory</i>	20	— <i>pallidiflora</i> , <i>Jord.</i> 158, 159, 160, 162, 163, 164, 165	
— <i>coronans</i>	22	— <i>Petteri</i> , <i>Koch</i>	166, 167
— <i>viridis</i>	22	— <i>speciosa</i> , <i>Jord.</i> 158, 159, 162, 163, 167	
— <i>vulgaris</i>	22	<i>Funaria hygrometrica</i> , <i>Dill.</i>	80
<i>Echinus</i> , <i>L.</i>	21	— <i>radians</i> , <i>Mitt.</i>	80
<i>Echites</i> , <i>L.</i>	183	<i>Gentiana</i> , <i>L.</i>	178, 191
<i>Elæis</i> , <i>Jacqu.</i>	21	— <i>cernua</i> , <i>Humb.</i>	191
— <i>Guineensis</i> , <i>Jacqu.</i>	21	<i>Geranium</i> , <i>L.</i>	14, 15
<i>Elaphoglossum</i>	20	<i>Geum rivale</i> , <i>L.</i>	14
<i>Elymus geniculatus</i> , <i>Curt.</i>	196	<i>Gigartina pistillata</i> , <i>Lamour.</i>	103
<i>Eucalypta australis</i> , <i>Mitt.</i>	72	<i>Glypomitrium acutifolium</i> , <i>Mitt.</i>	73
— <i>vulgaris</i> , <i>Hedw.</i>	72	— <i>Adamsoni</i> , <i>Mitt.</i>	73
<i>Entosthodon apophysatus</i> , <i>Mitt.</i>	80	— <i>crispatum</i> , <i>Brid.</i>	73, 74
— <i>laxus</i> , <i>Mitt.</i>	80	— <i>Fernandezianum</i> , <i>Mitt.</i>	74
— <i>Mittenii</i> , <i>Dozy & Molk.</i>	80	— <i>Mülleri</i> , <i>Mitt.</i>	74
— <i>productus</i> , <i>Mitt.</i>	80	— <i>polyphyllum</i> , <i>Mitt.</i>	73, 74
<i>Ephemerum cristatum</i> , <i>Mitt.</i>	79	<i>Gnaphalium</i> , <i>L.</i>	16, 178, 191
<i>Epidendrum</i> , <i>L.</i>	191	<i>Griffithsia secundiflora</i>	102
<i>Epilobium</i> , <i>L.</i>	16, 188	<i>Grimmia apocarpa</i> , <i>Hedw.</i>	72
<i>Epimedium alpinum</i> , <i>L.</i>	196	— <i>crispula</i> , <i>Mitt.</i>	73
<i>Equisetum</i> , <i>L.</i>	9	— <i>emersa</i> , <i>C. Müll.</i>	73
<i>Erigeron</i> , <i>L.</i>	16	— <i>leucophæa</i> , <i>Grev.</i>	73
<i>Eriophorum alpinum</i> , <i>L.</i>	196	— <i>pulvinata</i> , <i>Hook. & Tayl.</i>	72
<i>Eryngium</i> , <i>L.</i>	22	— <i>symphyodonta</i> , <i>C. Müll.</i>	73
<i>Erythrina</i> , <i>L.</i>	186	— <i>trichophylla</i> , <i>Grev.</i>	73
<i>Euphorbiaceæ</i>	25	<i>Gymnogramma Calomelanos</i> , <i>Sw.</i>	22
<i>Fissidens adiantoides</i> , <i>Hedw.</i>	93	<i>Gymnopteris</i> , <i>Presl</i>	22
— <i>integerrimus</i> , <i>Mitt.</i>	94	<i>Hedwigia ciliata</i> , <i>Ehrh.</i>	90
— <i>pallidus</i> , <i>Hook. f. & Wils.</i> 93, 94		— <i>Humboldtii</i> , <i>Hook.</i>	90
— <i>pygmæus</i> , <i>Tayl.</i>	93	— <i>imberbis</i> , <i>Spruce</i>	90
— <i>rigidulus</i> , <i>Hook. f. & Wils.</i>	93	<i>Hedyotis</i> , <i>L.</i>	179
— <i>Taylori</i> , <i>C. Müll.</i>	93	— <i>ericoides</i>	178
— <i>tenellus</i> , <i>Hook. f. & Wils.</i>	93	<i>Hedysarum</i> , <i>L.</i>	15
<i>Flacourtianæ</i>	60	<i>Herpestes chamædryoides</i> , <i>H.B.K.</i> 188	
<i>Flustra</i> , <i>L.</i>	21	<i>Heterostemon simplicifolium</i> , <i>Spruce</i> 60	
<i>Fourcroya</i> , <i>Vent.</i>	29	<i>Hieracium</i> , <i>L.</i>	188
<i>Fragaria Canadensis</i> , <i>Mich.</i>	9	<i>Hippophæa rhamnoides</i> , <i>L.</i>	9
<i>Frankenia pulverulenta</i> , <i>L.</i>	196		
<i>Fraxinus</i> , <i>L.</i>	2, 9		
<i>Fuchsia</i> , <i>L.</i>	190		

	Page		Page
<i>Holomitrium cirrhatum</i> , <i>Brid.</i>	70	<i>Hypnum subbasilare</i> , <i>Hook.</i>	86
<i>Homalium</i> , <i>Jacqu.</i>	31, 33, 200	— <i>tenuifolium</i> , <i>Hedw.</i>	85
— <i>Africanum</i> , <i>Benth.</i>	35	— <i>Vaucheri</i> , <i>Lesq.</i>	85
— <i>angustifolium</i> , <i>Sm.</i>	37	<i>Hypopterygium Novæ Zelandiæ</i> , <i>C. Müll.</i>	96
— <i>axillare</i> , <i>Benth.</i>	34, 200	— <i>Smithianum</i> , <i>Hook. f. & Wils.</i>	96
— <i>bracteatum</i> , <i>Benth.</i>	37	— <i>Struthiopteris</i> , <i>Brid.</i>	96
— <i>caryophyllatum</i> , <i>Benth.</i>	38	<i>Ilex</i> , <i>L.</i>	183
— <i>cordylanthus</i> , <i>Benth.</i>	38	<i>Impatiens</i> , <i>L.</i>	106
— <i>densiflorum</i> , <i>Spruce</i>	36	— <i>acaulis</i> , <i>Arn.</i>	115, 119
— <i>fagifolium</i> , <i>Benth.</i>	35	— <i>acuminata</i> , <i>Benth.</i>	117, 145
— <i>fœtidum</i> , <i>Benth.</i>	37	— <i>Akka</i> , <i>Bedd.</i>	156
— <i>grandiflorum</i> , <i>Benth.</i>	37	— <i>albida</i> , <i>Wight</i>	135
— <i>longifolium</i> , <i>Benth.</i>	35	— <i>amphorata</i> , <i>Edgew.</i>	148
— <i>Nepalense</i> , <i>Benth.</i>	34	— <i>amplexicaulis</i> , <i>Edgew.</i>	109, 110, 117, 129
— <i>paniculatum</i> , <i>Benth.</i>	34, 200	— <i>Anamallayensis</i> , <i>Bedd.</i>	156
— <i>parvifolium</i> , <i>Hook. fil.</i>	37	— <i>appendiculata</i> , <i>Arn.</i>	114, 143
— <i>pedicellatum</i> , <i>Spruce</i>	36	— <i>arguta</i> , <i>Hook. f. & Thoms.</i>	116, 117, 137
— <i>racemosum</i> , <i>Jacqu.</i>	36	— <i>Arnottiana</i> , <i>Migu.</i>	122
— <i>Racoubea</i> , <i>Sw.</i>	35	— <i>auriculata</i> , <i>Wight</i>	116, 141, 142
— <i>rufescens</i> , <i>Benth.</i>	34	— <i>Balsamina</i> , <i>L.</i>	113, 114, 115, 116, 117, 130
— <i>senarium</i> , <i>DC.</i>	36	— <i>bella</i> , <i>Hook. f. & Thoms.</i>	116, 138
— <i>Surinamense</i> , <i>Steud.</i>	36	— <i>bicolor</i> , <i>Royle</i>	148
— <i>tomentosum</i> , <i>Benth.</i>	36	— <i>bicornuta</i> , <i>Wall.</i>	147, 149
— <i>vitense</i> , <i>Benth.</i>	36	— <i>bifida</i> , <i>Thb.</i>	125
— <i>zeylanicum</i> , <i>Benth.</i>	35	— <i>bracteata</i> , <i>Colebr.</i>	117, 142
<i>Hookeria crispula</i> , <i>Hook. f. & Wils.</i>	96	— <i>brachycentra</i> , <i>Kar. & Kir.</i>	118, 155
— <i>microcarpa</i> , <i>Hook.</i>	95	— <i>brevicornu</i> , <i>Arn.</i>	132
— <i>pulchella</i> , <i>Hook. f. & Wils.</i>	95	— <i>campanulata</i> , <i>Wight</i>	113, 116, 145, 157
<i>Hydroceras triflora</i> , <i>Wt. & Arn.</i>	110, 156	— <i>candida</i> , <i>Lindl.</i>	128
<i>Hydrophyllaceæ.</i>	25	— <i>capillipes</i> , <i>Hook. f. & Thoms.</i>	113, 114, 135
<i>Hymenodon pilifer</i> , <i>Hook. f. & Wils.</i>	95	— <i>Chinensis</i> , <i>L.</i>	114, 115, 116, 119, 120
<i>Hypnum</i> , <i>L.</i>	22	— <i>circæoides</i> , <i>Wall.</i>	114, 130
— <i>aciculare</i> , <i>Brid.</i>	88	— <i>coccinea</i> , <i>Sims</i>	131
— <i>arcuatum</i> , <i>Hedw.</i>	86	— <i>cordata</i> , <i>Wight</i>	144, 157
— <i>aristatum</i> , <i>Hook. f. & Wils.</i>	85	— <i>cornigera</i> , <i>Arn.</i>	113, 114, 149, 150
— <i>asperipes</i> , <i>Mitt.</i>	85	— <i>cornigera</i> , <i>Hook.</i>	131
— <i>auriculatum</i> , <i>Mont.</i>	88	— <i>crenata</i> , <i>Bedd.</i>	156
— <i>brachycarpum</i> , <i>Hampe</i>	87	— <i>cristata</i> , <i>Wall.</i>	136
— <i>Buchanani</i> , <i>Hook.</i>	85	— <i>cristigera</i> , <i>Edgew.</i>	148
— <i>chrysogaster</i> , <i>C. Müll.</i>	87	— <i>cuspidata</i> , <i>Wight & Arn.</i>	124, 125
— <i>cochlearifolium</i> , <i>Schw.</i>	88	— <i>Dalzellii</i> , <i>Hook. f. & Th.</i>	115, 123
— <i>campestre</i> , <i>Br. & Sch.</i>	85	— <i>dasyperma</i> , <i>Wight</i>	115, 134
— <i>comosum</i> , <i>Schw.</i>	86	— <i>discolor</i> , <i>Dec.</i>	116, 117, 137, 138
— <i>contiguum</i> , <i>Hook. f. & Wils.</i>	87	— <i>diversifolia</i> , <i>Wall.</i>	115, 121, 122, 123
— <i>curviculatum</i> , <i>Hook. f. & Wils.</i>	87	— <i>elata</i> , <i>Edgew.</i>	155, 156
— <i>cymbifolium</i> , <i>Doz. & Molk.</i>	92	— <i>elegans</i> , <i>Bedd.</i>	157
— <i>deflexum</i> , <i>Wils.</i>	88	— <i>elongata</i> , <i>Arn.</i>	114, 149, 150
— <i>densifolium</i> , <i>Brid.</i>	89	— <i>fasciculata</i> , <i>Lam.</i>	119, 124, 126
— <i>Donianum</i> , <i>Smith</i>	88	— <i>filiformis</i> , <i>Wight & Arn.</i>	122, 157
— <i>hians</i> , <i>Hedw.</i>	85	— <i>fimbriata</i> , <i>Hook.</i>	142
— <i>hispidum</i> , <i>Hook. f. & Wils.</i>	91	— <i>flaccida</i> , <i>Arn.</i>	114, 115, 134
— <i>Loxense</i> , <i>Hook.</i>	88	— <i>flavida</i> , <i>Hook. f. & Th.</i>	109, 116, 127
— <i>microcarpum</i> , <i>C. Müll.</i>	87	— <i>floribunda</i> , <i>Wight</i>	124
— <i>Mossmanianum</i> , <i>C. Müll.</i>	87	— <i>fruticosa</i> , <i>Lesch.</i>	110, 116, 127, 140
— <i>paradoxum</i> , <i>Hook. f. & Wils.</i>	85		
— <i>patale</i> , <i>Hook. f. & Wils.</i>	87		
— <i>piliferum</i> , <i>Brid.</i>	85		
— <i>ptychocarpum</i> , <i>Schw.</i>	89		
— <i>rutabulum</i> , <i>L.</i>	85		
— <i>spinervium</i> , <i>Hook.</i>	86		

	Page
<i>Impatiens fulva</i> , Nutt.	155
— <i>Gardneriana</i> , Wight 109, 115, 121	
— <i>gigantea</i> , Edgew.	128, 129
— <i>glandulifera</i> , Arn.	131, 132
— <i>glandulifera</i> , Royle 110, 113,	
114, 128	
— <i>glauca</i> , Hook. f. & Th.	118, 155
— <i>Goughii</i> , Wight	113, 115, 130
— <i>gracilis</i> , Bedd.	156
— <i>grandis</i> , Heyne	113, 116, 145
— <i>Griffithii</i> , Hook. f. & Th. 109,	
114, 120, 121	
— <i>Hamiltoniana</i> , Don	136
— <i>Hensloviana</i> , Arn. 114, 115, 135	
— <i>heterophylla</i> , Wall.	119, 122
— <i>hispidula</i> , Benth.	141
— <i>Hookeriana</i> , Arn.	114, 145
— <i>inconspicua</i> , Benth. 115, 122, 157	
— <i>insignis</i> , Wall. 109, 118, 137,	
143, 149, 150	
— <i>janthina</i> , Thwaites 108, 114, 142	
— <i>Jerdoniae</i> , Wight	107, 110,
113, 116, 141, 142, 149	
— <i>Jurpia</i> , Ham. 110, 117, 140, 146	
— <i>Kleinii</i> , Wight & Arn. 115, 120, 122	
— <i>lævigata</i> , Wall.	117, 118, 146
— <i>latiflora</i> , Hook. f. & Th. 116, 117, 139	
— <i>latifolia</i> , L. 109, 113, 114, 115, 124	
— <i>latifolia</i> , Wight & Arn.	125
— <i>Lawii</i> , Hook. f. & Th.	115, 122
— <i>laxiflora</i> , Edgew. 118, 149, 153, 154	
— <i>Lemanni</i> , Hook. f. & Th. 111,	
118, 154	
— <i>leptoceras</i> , Dec. 107, 109, 110,	
117, 118, 148, 152	
— <i>leptopoda</i> , Arn. 112, 113, 114,	
132, 133	
— <i>Leschenaultii</i> , Dec. 115, 124, 125	
— <i>leucantha</i> , Thwaites.	114, 142
— <i>ligulata</i> , Bedd.	156
— <i>linearis</i> , Arn. 113, 114, 140, 143, 145	
— <i>longicornu</i> , Str. & Wint.	147
— <i>longicornu</i> , Wall. 107, 108,	
113, 118, 128, 129, 148, 149, 153	
— <i>longipes</i> , Hook. f. & Th. 110,	
118, 151, 152	
— <i>lucida</i> , Heyne	115, 125
— <i>lucida</i> , Wall.	134
— <i>macrochila</i> , Lindl.	128
— <i>macrophylla</i> , Gardn. 108, 113,	
114, 131, 132	
— <i>maculata</i> , Wight	116, 149, 157
— <i>micrantha</i> , Don	147, 151
— <i>micranthemum</i> , Edgew.	154
— <i>modesta</i> , Wight	115, 118
— <i>mollis</i> , Wall.	141
— <i>moschata</i> , Edgew.	128
— <i>multiflora</i> , Wall. 109, 116, 117, 126	
— <i>Munronii</i> , Wight	115, 133
— <i>Mysorensis</i> , Roth 112, 115, 133	

	Page
<i>Impatiens Mysorensis</i> , Wall. 120, 122	
— <i>Noli-tangere</i> , L.	155
— <i>odorata</i> , Don	153
— <i>odorata</i> , Ham.	148
— <i>oppositifolia</i> , L. 114, 115, 120, 124	
— <i>pallens</i> , Edgew.	148
— <i>parasitica</i> , Bedd.	157
— <i>parviflora</i> , Dec.	156
— <i>parvifolia</i> , Bedd.	157
— <i>pendula</i> , Heyne 112, 115, 133, 157	
— <i>phoenicea</i> , Bedd.	156, 157
— <i>picta</i> , Flor. Cab.	148
— <i>porrecta</i> , Wall.	116, 138
— <i>puberula</i> , Dec.	117, 141
— <i>pulcherrima</i> , Dalz.	115, 134
— <i>pulchra</i> , Hook. f. & Th. 117, 139	
— <i>Pulneyensis</i> , Bedd.	156, 157
— <i>pusilla</i> , Heyne	122, 123
— <i>racemosa</i> , Wall. 107, 108, 117,	
118, 147, 151, 153	
— <i>racemulosa</i> , Wall. 108, 116,	
136, 138	
— <i>radicans</i> , Benth.	112, 116, 126
— <i>ramosissima</i> , Dalz.	121
— <i>repens</i> , Moon	109, 114, 132
— <i>reticulata</i> , Wall.	121
— <i>rivalis</i> , Wight	115, 119, 157
— <i>rosea</i> , Lindl.	131
— <i>rosmarinifolia</i> , Retz.	120
— <i>Roylei</i> , Walp. 110, 113, 117,	
127, 129, 149	
— <i>rufescens</i> , Benth.	115, 121
— <i>salicifolia</i> , Hook. f. & Th. 109,	
112, 116, 124	
— <i>scabrida</i> , Dec. 107, 113, 117, 136	
— <i>scabriuscula</i> , Heyne 113, 115,	
131, 133	
— <i>scapiflora</i> , Heyne 109, 115,	
118, 119, 157	
— <i>scapiflora</i> , Hook.	119
— <i>serrata</i> , Benth.	113, 117, 136
— <i>setacea</i> , Colebr.	120
— <i>setosa</i> , Hook. f. & Th.	115, 123
— <i>spirifer</i> , Hook. f. & Th. 117, 135, 137	
— <i>Stocksii</i> , Hook. f. & Th. 115, 119	
— <i>subcordata</i> , Arn.	114, 144, 150
— <i>sulcata</i> , Wall. 113, 117, 128,	
129, 148, 149	
— <i>Tangachee</i> , Bedd.	157
— <i>Tavagua</i> , Steud.	146
— <i>Tavoyana</i> , Benth. 114, 130, 146	
— <i>tenella</i> , Heyne	115, 123
— <i>tenuicula</i> , Steud.	123
— <i>tenuis</i> , Bedd.	156
— <i>ternifolia</i> , Ham.	126
— <i>Thomsoni</i> , Hook. f. 109, 117, 128	
— <i>tingens</i> , Edgew.	107, 117,
118, 147, 151, 153	
— <i>tomentosa</i> , Heyne	115, 121
— <i>tricornis</i> , Lindl.	136

	Page		Page
<i>Impatiens trilobata</i> , Colebr.	109,	<i>Leskea hastata</i> , C. Müll.	93
— <i>tripetala</i> , Roxb.	116, 117, 126	— <i>hispidula</i> , Mitt.	91, 92
— <i>truncata</i> , Thwaites.	114, 133	— <i>læviuscula</i> , Mitt.	92
— <i>tuberculata</i> , Hook. f. & Th.	107,	— <i>mollis</i> , Hedw.	88
	118, 155	— <i>sciuroides</i> , Hook.	89
— <i>umbellata</i> , Heyne	113, 116,	— <i>tamariscina</i> , Hedw.	92
	143, 144	— <i>umbrosa</i> , Mitt.	92
— <i>umbrosa</i> , Edgew.	148	<i>Leucobryum candidum</i> , Dill.	70
— <i>uncinata</i> , Wight	116, 144, 150	<i>Leucodon lagurus</i> , Hook.	88
— <i>urticifolia</i> , Wall.	110, 113,	— <i>nitidus</i> , Hook. f. & Wils.	89
	137, 151, 152	<i>Lithospermum</i> , L.	9
— <i>verrucosa</i> , Bedd.	156	<i>Lobelia</i> , L.	179
— <i>verticillata</i> , Wight	115, 129	<i>Lopidium pallens</i> , Hook. f. & Wils.	96
— <i>viridiflora</i> , Wight	110, 116, 142, 157	<i>Loranthus</i> , L.	190
— <i>viscida</i> , Wight	116, 144, 157	<i>Lucina</i> , Juss.	183
— <i>viscosa</i> , Bedd.	156	<i>Lupinus</i> , L.	178
— <i>Walkeri</i> , Hook.	107, 113, 114, 149	<i>Luzula</i> , Dec.	16
— <i>Wightiana</i> , Bedd.	157	<i>Lycium</i> , L.	188, 190
<i>Inga</i> , Willd.	188	<i>Lycopodium</i> , L.	22, 178
<i>Ionidium</i> , Vent.	190	— <i>dendroideum</i> , Swartz	22
<i>Iris</i> , L.	184	— <i>Phlegmaria</i> , L.	22
<i>Isotheceum gracile</i> , Hook. f. & Wils.	88	<i>Lygodium scandens</i> , Swartz	22
— <i>pumilum</i> , Hook. f. & Wils.	89	<i>Macromitrium Archeri</i> , Mitt.	78
<i>Jatropha multifida</i> , L.	20	— <i>erosulum</i> , Mitt.	78
<i>Juncus</i> , L.	190	— <i>gracile</i> , Hook.	79
<i>Juniperus communis</i> , L.	16	— <i>hemitrichodes</i> , Mitt.	78, 79
<i>Jussiaea villosa</i> , Lam.	25	— <i>ligulare</i> , Mitt.	78
<i>Lantana</i> , L.	188	— <i>microphyllum</i> , Mitt.	78
<i>Lasionema roseum</i>	186	— <i>Mossmannianum</i> , C. Müll.	79
<i>Lastrea</i> , Bory	22	— <i>orthophyllum</i> , Mitt.	79
— <i>Felix Mas</i> , Bory	192, 193	— <i>prorepens</i> , Mitt.	78
— <i>invisa</i> , Presl	22	— <i>pusillum</i> , Mitt.	78
— <i>mollis</i> , Presl	22	<i>Medicago sativa</i> , L.	180
— <i>remota</i> , Moore	193	<i>Melastomaceæ</i>	20
— <i>rigida</i> , Presl	193	<i>Menziesia</i> , Smith	16
— <i>spinulosa</i> , Presl	192, 193	<i>Mertensia gigantea</i>	22
<i>Lathyrus</i> , L.	9, 13	<i>Meteorum aureum</i> , Mitt.	85
<i>Lemna</i> , L.	25	— <i>cuspidiferum</i> , Hook. f. & Wils.	91
<i>Leopoldinia</i> , Mart.	58	— <i>fulvum</i> , Mitt.	85
— <i>major</i> , Wallace	59	<i>Microcladia glandulosa</i> , Sol.	104
— <i>minor</i> , Mart.	58, 59	<i>Mielichhoferia Eckloni</i> , Hornsch.	84
— <i>Piassaba</i> , Wallace	58-62	<i>Mniadelphus crispulus</i> , Mitt.	96
<i>Leptangium Perrottetii</i> , Mont.	79	— <i>microcarpus</i> , Mitt.	95
— <i>repens</i> , Mitt.	79	— <i>pulchellus</i> , Mitt.	95
<i>Leptostomum flexipile</i> , C. Müll.	94	<i>Mniopsis</i> , Mitt.	94
— <i>inclinans</i> , R. Br.	94	— <i>Plumula</i> , Mitt.	94
<i>Leptotheca Gaudichaudi</i> , Schwagr.	94	<i>Monnina</i> , Ruiz & Pav.	187
<i>Leptotrichum affine</i> , C. Müll.	67	<i>Mussenda</i> , L.	20
— <i>australe</i> , Mitt.	66	<i>Nauclea</i> , L.	24
— <i>capillaceum</i> , Mitt.	67	<i>Neckera cerina</i> , Tayl.	90
— <i>ferrugineum</i> , Mitt.	67	— <i>cuspidifera</i> , Tayl.	90
— <i>Hookeri</i> , C. Müll.	67	— <i>hymenodonta</i> , C. Müll.	89
— <i>hyalinum</i> , Mitt.	67	— <i>luteola</i> , Tayl.	90
— <i>Jamesoni</i> , Mitt.	67	— <i>rivalis</i> , Mitt.	89
— <i>Oldfieldii</i> , Mitt.	67	— <i>setosa</i> , Hook.	89
— <i>præaltum</i> , Mitt.	66	<i>Nitophyllum laceratum</i> , Grev.	104
<i>Leskea cymbifolia</i> , Mitt.	92	<i>Nonatelia</i> , Aubl.	190
— <i>delicatula</i> , Mitt.	92, 93	<i>Norantea Guianensis</i> , Aubl.	183
— <i>fulvastra</i> , Mitt.	92	<i>Nymphæa dentata</i>	25
		<i>Odontoglossum</i> , Kunth	191

	Page
<i>Oleandra nodosa</i>	20
<i>Omalia oblongifolia</i> , <i>Hook. f. & Wils.</i>	89
<i>Oncidium</i> , <i>Jacqu.</i>	191
<i>Orchideæ</i>	22
<i>Orchis hircina</i> , <i>Scop.</i>	196
<i>Orobis</i> , <i>L.</i>	13
<i>Orthodontium sulcatum</i> , <i>Hook. f. & Wils.</i>	84
<i>Orthotrichum luteolum</i> , <i>Hook. f. & Wils.</i>	75, 76
— <i>Tasmanicum</i> , <i>Hook. f. & Wils.</i>	74
<i>Pandanus Candelabrum</i> , <i>Pal.</i>	22
<i>Papyrus antiquorum</i> , <i>Willd.</i>	25
<i>Paspalum</i> , <i>L.</i>	188
<i>Pedicularis</i> , <i>L.</i>	16
<i>Pentadesma butyracea</i> , <i>Afz.</i>	24
<i>Persea gratissima</i> , <i>Gærtn.</i>	20
<i>Phascum cristatum</i> , <i>Hook. f. & Wils.</i>	79
— <i>cylindricum</i> , <i>Tayl.</i>	70
<i>Phaseolus</i> , <i>L.</i>	188
<i>Philonotis appressa</i> , <i>Mitt.</i>	81
— <i>australis</i> , <i>Mitt.</i>	81
— <i>curvirostra</i> , <i>Mitt.</i>	81
— <i>dimorpha</i> , <i>Schimp.</i>	82
— <i>fontana</i> , <i>Brid.</i>	83
— <i>pusilla</i> , <i>Mitt.</i>	81
— <i>vagans</i> , <i>Mitt.</i>	81
<i>Phlox Hoodii</i> , <i>Richards.</i>	8
<i>Phrynium Danielli</i> , <i>Benn.</i>	25
<i>Physcomitrium conicum</i> , <i>Mitt.</i>	79
— <i>pyriforme</i> , <i>Brid.</i>	79
<i>Phytelephas</i> , <i>Ruiz & Pav.</i>	186
— <i>macrocarpa</i> , <i>Ruiz & Pav.</i>	62
<i>Pilotrichum ciliatum</i> , <i>C. Müll.</i>	90
— <i>croceum</i> , <i>Hampe</i>	91
— <i>flexicaule</i> , <i>Tayl.</i>	91
— <i>nigrescens</i> , <i>Hornsch.</i>	91
<i>Pinus Banksiana</i> , <i>Lamb.</i>	14
<i>Pistia Stratiotes</i> , <i>L.</i>	25
<i>Plagiochila</i>	189
<i>Plantago</i> , <i>L.</i>	178, 179
— <i>major</i> , <i>L.</i>	22
<i>Platycerium Stemaria</i> , <i>Desv.</i>	22
<i>Pleuridium alternifolium</i> , <i>Bruch</i>	65
— <i>gracilentum</i> , <i>Mitt.</i>	65
— <i>nitidum</i> , <i>Bruch</i>	65, 66
— <i>tenellum</i> , <i>Mitt.</i>	65
<i>Poa</i> , <i>L.</i>	9
— <i>alpina</i> , <i>L.</i>	16
— <i>annua</i> , <i>L.</i>	22
<i>Pogonatum alpinum</i> , <i>Brid.</i>	97
<i>Poinciana pulcherrima</i> , <i>L.</i>	20
<i>Polygala</i> , <i>L.</i>	188
<i>Polygonum viviparum</i> , <i>L.</i>	14
<i>Polypompholyx</i> , <i>Lehm.</i>	169, 171
— <i>laciniata</i> , <i>Benj.</i>	171
<i>Polystachya</i> , <i>Hook.</i>	22
<i>Polystichum remotum</i> , <i>Kock</i>	193
<i>Polytrichadelphus croceus</i> , <i>Mitt.</i>	98
— <i>formosus</i> , <i>Mitt.</i>	98

	Page
<i>Polytrichadelphus horridus</i> , <i>Mitt.</i>	98
— <i>innovans</i> , <i>C. Müll.</i>	97
— <i>Magellanicus</i> , <i>Mitt.</i>	97, 98, 99
<i>Polytrichum commune</i> , <i>L.</i>	20, 99
— <i>juniperinum</i> , <i>Hedw.</i>	99
<i>Populus</i> , <i>L.</i>	4-8, 10, 13, 14
— <i>balsamifera</i> , <i>L.</i>	2, 4, 8, 10, 15
— <i>grandidentata</i>	2
— <i>tremuloides</i> , <i>Mich.</i>	2, 8, 10, 15
<i>Potentilla</i> , <i>L.</i>	9
— <i>tridentata</i> , <i>Sol.</i>	196
<i>Psilopilum australe</i> , <i>Hook. f. & Wils.</i>	97
— <i>crispulum</i> , <i>Hook. f. & Wils.</i>	97
<i>Pterygophyllum denticulatum</i>	96
— <i>nigellum</i> , <i>Hook. f. & Wils.</i>	96
— <i>obscureum</i> , <i>Mitt.</i>	96
<i>Pythagorea Cochinchinensis</i> , <i>Lour.</i>	38
<i>Ranunculus</i> , <i>L.</i>	9, 178
<i>Raphia vinifera</i> , <i>Pal.</i>	24
<i>Rhacomitrium crispulum</i> , <i>Hook. f. & Wils.</i>	73
<i>Rhacopilum australe</i> , <i>Hook. f. & Wils.</i>	93
— <i>cristatum</i> , <i>Hook. f. & Wils.</i>	93
— <i>lætum</i> , <i>Mitt.</i>	93
— <i>spectabile</i> , <i>Reimw. & Hornsch.</i>	93
— <i>strumiferum</i> , <i>C. Müll.</i>	93
— <i>tomentosum</i> , <i>Brid.</i>	93
<i>Rhamnus</i> , <i>L.</i>	190
<i>Rhipsalis</i> , <i>L.</i>	25
<i>Rhizogonium distichum</i> , <i>Brid.</i>	95
— <i>Hookeri</i> , <i>C. Müll.</i>	95
— <i>Mossmanianum</i> , <i>C. Müll.</i>	95
— <i>Mülleri</i> , <i>Hampe</i>	95
— <i>Novæ Hollandiæ</i> , <i>Brid.</i>	95
— <i>spiniforme</i> , <i>Brid.</i>	95
<i>Rhizophora</i> , <i>L.</i>	22
<i>Rhodhymenia laciniata</i> , <i>Grev.</i>	104
<i>Richardsonia</i> , <i>L.</i>	190
<i>Rosa rubella</i> , <i>Winch.</i>	198, 199
— <i>spinosissima</i> , <i>L.</i>	198, 199
<i>Rubiaceæ</i>	24, 25
<i>Rubus</i> , <i>L.</i>	195, 196, 197
<i>Saccharum officinale</i> , <i>L.</i>	19
<i>Salix</i> , <i>L.</i> 3, 8, 9, 10, 13, 14, 15, 39, 195	
— <i>acmophylla</i>	40
— <i>alba</i> , <i>L.</i>	43, 44
— <i>apiculata</i> , <i>Anders.</i>	39, 42
— <i>Arbuscula</i> , <i>L.</i>	54, 55
— <i>Babylonica</i> , <i>L.</i>	39, 40, 43, 44
— <i>berberifolia</i> , <i>Pall.</i>	58
— <i>Brayi</i>	58
— <i>calophylla</i> , <i>Wall.</i>	39, 42
— <i>calostachya</i> , <i>Anders.</i>	39, 42
— <i>calyculata</i> , <i>Hook. fl.</i>	40, 55
— <i>Caprea</i> , <i>L.</i>	40, 50
— <i>cuspidata</i> , <i>Don</i>	39, 43
— <i>Daltoniana</i> , <i>Anders.</i>	40, 49
— <i>daphnoides</i> , <i>L.</i> 40, 45, 46, 47, 53	
— <i>dealbata</i> , <i>Anders.</i>	40, 43
— <i>densa</i> , <i>Wall.</i>	39, 42

	Page		Page
<i>Salix disperma</i> , Don	39, 42	<i>Salix vagans</i> , Hook. f.	54
— <i>elegans</i> , Wall.	39, 40, 51	— <i>viminialis</i> , L.	40, 48, 49, 50
— <i>eriophylla</i> , Anders.	40, 48	— <i>Wallichiana</i> , Anders.	40, 50
— <i>eriosstachya</i> , Wall.	39, 40, 46	<i>Salvia</i> , L.	190
— <i>flabellaris</i> , Anders.	40, 54	<i>Salvinia</i> , L.	25
— <i>fruticulosa</i> , Anders.	40, 53	<i>Sarcocephalus</i> , Don	24
— <i>glabrescens</i> , Wall.	39	<i>Sauloma tenella</i> , Hook. f. & Wils.	89
— <i>glaucophylla</i> , Anders.	39, 43	<i>Saussurea</i> , Dec.	16
— <i>Govaniana</i> , Wall.	51	<i>Saxifraga</i> , L.	16
— <i>grisea</i> , Wall.	39, 42	<i>Schistidium marginatum</i> , Hook. f. & Wils.	72
— <i>hastata</i> , L.	40, 51, 54	<i>Senecio</i> , L.	191
— <i>herbacea</i> , L.	54	— <i>paludosus</i> , L.	196
— <i>Himalensis</i> , Klotzsch	51	<i>Sheadendron</i> , J. Bertol.	167
— <i>Hugelii</i> , Wimm.	41	— <i>butyrosomum</i> , J. Bertol.	167, 168
— <i>ichnostachya</i> , Lindl.	39, 41	<i>Shepherdia argentea</i> , Mitt.	3
— <i>insignis</i> , Anders.	40, 47	<i>Silene</i> , L.	16
— <i>Japonica</i> , Thunb.	39, 44	— <i>acaulis</i> , L.	16
— <i>julacea</i> , Anders.	40, 50	<i>Sonchus palustris</i> , L.	196
— <i>Kamanensis</i> , Wall.	39, 51	<i>Sphagnum acutifolium</i> , Ehrh.	100
— <i>laurina</i> , Smith	45	— <i>antarcticum</i> , Mitt.	100
— <i>lenta</i> , Fries	39, 42	— <i>australe</i> , Mitt.	100
— <i>Lindleyana</i> , Wall.	39, 40, 56, 57	— <i>compactum</i> , Brid.	99, 100
— <i>longiflora</i> , Wall.	40, 50	— <i>confertum</i> , Mitt.	99
— <i>longipes</i> , Hook. f.	56	— <i>contortum</i> , Schz.	99
— <i>lucida</i> , Jacquem.	54	— <i>cymbifolioides</i> , C. Müll.	100
— <i>myricæfolia</i> , Anders.	40, 53	— <i>cymbifolium</i> , Dill.	99, 100
— <i>Myrsinites</i> , L.	56	— <i>molliculum</i> , Mitt.	99
— <i>myrtillacea</i> , Anders.	40, 51	— <i>Novo-Zelandicum</i> , Mitt.	99
— <i>myrtilloides</i> , L.	52	— <i>plumosum</i>	99, 100
— <i>Myurus</i> , Wimm.	41	— <i>subsecundum</i> , C. Müll.	99
— <i>Nilagirica</i> , Miqu.	41	<i>Spiræa</i> , L.	188
— <i>nobilis</i> , Fries	39, 42	<i>Splachnum octoblepharum</i> , Hook.	80
— <i>obovata</i> , Wall.	39, 54	<i>Stachys</i> , L.	178, 188
— <i>octandra</i> , Sieb.	40, 43	<i>Stenochlæna scandens</i> , J. Smith	22
— <i>oreophila</i> , Hook. f.	40, 57, 58	<i>Stenogramme interrupta</i> , Ag.	103
— <i>oxycarpa</i> , Anders.	40, 45, 46	<i>Sterculiaceæ</i>	18, 25
— <i>pentandra</i> , L.	40	<i>Stereodon acicularis</i> , Mitt.	89
— <i>phylicifolia</i> , L.	45, 46, 50, 51	— <i>angustatus</i> , Mitt.	88
— <i>populifolia</i> , Anders.	40, 48	— <i>arbuscula</i> , Mitt.	88
— <i>pseudogrisea</i> , Steud.	42	— <i>auriculatus</i> , Mitt.	88
— <i>psilostigma</i> , Anders.	48	— <i>brachycarpus</i> , Mitt.	87
— <i>purpurea</i> , L.	40	— <i>chrysogaster</i> , Mitt.	87
— <i>pycnostachya</i> , Anders.	40, 44	— <i>cochlearifolius</i> , Mitt.	88
— <i>pyrina</i> , Wall.	39, 41	— <i>contiguus</i> , Mitt.	87
— <i>repens</i> , L.	52	— <i>cupressiformis</i> , Brid.	87
— <i>reticulata</i> , L.	55	— <i>curviculatus</i> , Mitt.	87
— <i>retusa</i> , L.	54, 57	— <i>cyperoides</i> , Brid.	87
— <i>rotundifolia</i> , Royle	54	— <i>deflexus</i> , Mitt.	88
— <i>rubra</i> , Huds.	40, 44, 46	— <i>densifolius</i> , Mitt.	89
— <i>sclerophylla</i> , Anders.	40, 52	— <i>Donianus</i> , Mitt.	88
— <i>secta</i> , Hook. f.	40, 57, 58	— <i>ericoides</i> , Mitt.	89
— <i>sericocarpa</i> , Anders.	40, 43	— <i>gracilis</i> , Mitt.	88
— <i>Serpyllum</i> , Anders.	40, 55	— <i>Jolliffii</i> , Mitt.	87
— <i>Sibirica</i> , Pall.	53	— <i>lagurus</i> , Mitt.	88
— <i>Smithiana</i> , Willd.	40, 48, 50	— <i>Loxensis</i> , Mitt.	87, 88
— <i>stipularis</i> , Smith	49	— <i>Lyallii</i> , Mitt.	89
— <i>suaveolens</i> , Anders.	39, 41	— <i>microcarpus</i> , Mitt.	87
— <i>tetrasperma</i> , Roxb.	39, 40, 41, 43	— <i>mollis</i> , Mitt.	88
— <i>Thomsoniana</i> , Anders.	40, 54	— <i>ptychocarpus</i> , Mitt.	89
— <i>urophylla</i> , Lindl.	39, 41		

	Page		Page
<i>Stereodon sciuroides</i> , <i>Mitt.</i>	89	<i>Utricularia angustifolia</i> , <i>Benj.</i> . . .	174
<i>Streptopogon erythrodonta</i> , <i>Wils.</i> . .	72	— <i>appressa</i> , <i>St. Hil.</i>	175
— <i>marginatus</i> , <i>Mitt.</i>	72	— <i>Benjaminiana</i> , <i>Oliv.</i>	176
— <i>nnioides</i> , <i>Mitt.</i>	72	— <i>bicolor</i> , <i>St. Hil.</i>	174
<i>Syntrichia Fuegiana</i> , <i>Mitt.</i>	71	— <i>colorata</i> , <i>Benj.</i>	175
— <i>lævipila</i> , <i>Brid.</i>	71	— <i>cornuta</i> , <i>Mich.</i>	175
— <i>princeps</i> , <i>Mitt.</i>	71, 72	— <i>foliosa</i> , <i>L.</i>	171
— <i>ruralis</i> , <i>Web. & Mohr.</i>	71, 72	— <i>inflata</i> , <i>Walt.</i>	171, 176
<i>Tæniopteris</i> , <i>Hook.</i>	22	— <i>Jamesoniana</i> , <i>Oliv.</i>	169
<i>Tecoma</i> , <i>Juss.</i>	188	— <i>longeciliata</i> , <i>A. Dec.</i>	171
<i>Tetralobus</i> , <i>A. Dec.</i>	171	— <i>montana</i> , <i>Jacqu.</i>	170
<i>Theobroma Cacao</i> , <i>L.</i>	19	— <i>myriocysta</i> , <i>St. Hil.</i>	171
<i>Thibaudia</i> , <i>R. & Pav.</i>	186	— <i>neottioides</i> , <i>St. Hil.</i>	173, 174
<i>Thuja</i> , <i>L.</i>	1	— <i>nervosa</i> , <i>G. Web.</i>	175
<i>Tortula Australasiæ</i> , <i>Hook. & Grev.</i> .	70	— <i>oligosperma</i> , <i>St. Hil.</i>	171
— <i>cæspitosa</i> , <i>Hook. f. & Wils.</i> . .	71	— <i>pallens</i> , <i>St. Hil.</i>	171
— <i>calycina</i> , <i>Schwagr.</i>	70	— <i>Parkeriana</i> , <i>Dec.</i>	171
— <i>Knightii</i> , <i>Mitt.</i>	71	— <i>peltata</i> , <i>Spr.</i>	172
— <i>Northiana</i> , <i>Grev.</i>	71	— <i>purpurea</i> , <i>Walt.</i>	171
— <i>torquata</i> , <i>Tayl.</i>	70	— <i>quinqu radiata</i> , <i>Spr.</i>	171
<i>Trachyloma Archeri</i> , <i>Mitt.</i>	86	— <i>Spruceana</i> , <i>Oliv.</i>	173
— <i>arcuata</i> , <i>Mitt.</i>	86, 87	— <i>stellaris</i> , <i>L.</i>	25
— <i>comosa</i> , <i>Mitt.</i>	86	— <i>subulata</i> , <i>L.</i>	175
— <i>Kerrii</i> , <i>Mitt.</i>	86	— <i>trichophylla</i> , <i>Spr.</i>	173
— <i>planifolia</i> , <i>Brid.</i>	86	— <i>unifolia</i> , <i>Ruiz & Pav.</i>	170
— <i>subbasilaris</i> , <i>Mitt.</i>	86	— <i>viscosa</i> , <i>Spr.</i>	172
<i>Trachypus cerinus</i> , <i>Mitt.</i>	91	— <i>vulgaris</i> , <i>Fl. Flum.</i>	171
— <i>flexicaulis</i> , <i>Mitt.</i>	91	— <i>Wallichiana</i> , <i>Oliv.</i>	176
— <i>Hornschuchii</i> , <i>Mitt.</i>	90	<i>Vaccinium</i> , <i>L.</i>	16
— <i>nigrescens</i> , <i>Mitt.</i>	91	<i>Valeriana</i> , <i>L.</i>	16, 178
<i>Trematodon brevicollis</i> , <i>Hornsch.</i> .	68	<i>Vallisneria spiralis</i> , <i>L.</i>	25
— <i>flexicollis</i> , <i>Mitt.</i>	68	<i>Veronica</i> , <i>L.</i>	20
<i>Trichomanes</i> , <i>L.</i>	22, 186	<i>Vicia</i> , <i>L.</i>	13
— <i>crispum</i> , <i>L.</i>	20	<i>Viola</i> , <i>L.</i>	9
<i>Tridontium Tasmanicum</i> , <i>Hook. f.</i> .	70	<i>Webera nutans</i> , <i>Hedw.</i>	84
<i>Triplaris Surinamensis</i> , <i>Miqu.</i> . .	186	<i>Weissia cirrhata</i> , <i>Hedw.</i>	70
<i>Tussilago</i> , <i>L.</i>	9	— <i>controversa</i> , <i>Hedw.</i>	70
<i>Typha angustifolia</i> , <i>L.</i>	25	— <i>radians</i> , <i>Hedw.</i>	80
<i>Ulot carinata</i> , <i>Mitt.</i>	75	— <i>stricta</i> , <i>Hook. f. & Wils.</i> . . .	66
— <i>Darwinii</i> , <i>Mitt.</i>	77	<i>Werneria</i> , <i>H. B. K.</i>	178, 191
— <i>Eremitensis</i> , <i>Mitt.</i>	76	— <i>nubigena</i> , <i>H. B. K.</i>	178
— <i>Fuegiana</i> , <i>Mitt.</i>	76, 77	<i>Yucca</i> , <i>L.</i>	177
— <i>fulvella</i> , <i>Mitt.</i>	75	<i>Zygodon Brownii</i> , <i>Schwagr.</i> . . .	74
— <i>germana</i> , <i>Brid.</i>	75	— <i>cyathocarpus</i> , <i>Mont.</i>	70
— <i>glabella</i> , <i>Mitt.</i>	76	— <i>intermedius</i> , <i>Br. & Sch.</i> . . .	74
— <i>Hutchinsiae</i> , <i>Brid.</i>	76	— <i>Lapponicus</i> , <i>Br. & Sch.</i> . . .	70
— <i>lutea</i> , <i>Mitt.</i>	77	— <i>Menziesii</i> , <i>Arn.</i>	74
— <i>macrocalycina</i> , <i>Mitt.</i>	75	— <i>Mougeotii</i> , <i>Br. & Sch.</i> . . .	70
<i>Utricularia</i> , <i>L.</i>	169	— <i>Reinwardtii</i> , <i>Schwagr.</i> . . .	74

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